American Machinist

A McGraw-Hill Publication . . . Established 1877

New York, March 27, 1930

A European car building plant that has successfully adopted American production methods

American Management Methods in a European Car Shop

By Wallace Clark

Consulting Management Engineer

CAN European industries adopt American production methods and work at American speed? The answer must of course be qualified. In many cases, the owners and the managers are so bound by tradition that it is impossible for them to understand the new industrial age. Where, however, the owners are open-minded and the executives are decisive, it is possible to attain a speed of production which very nearly approaches the American tempo. As for the workmen, if they are dealt with intelligently and sympathetically, and there is no danger of their being thrown out of employment, they are quite willing to learn new methods and to do their work quickly and accurately.

A specific case may show how an old business which was moving at a dignified and deliberate pace changed to a typical American speed. This business began 110 years ago as a foundry and machine shop, is now engaged in building railway cars, and employs just under 3,000 workmen. The principal product is passenger cars, with freight cars second, and tram cars third in importance.

Building Pullman Passenger Cars

It would be difficult to find a more complex type of manufacture than that of railway passenger cars of steel construction fitted with wood inside. Many different kinds of skilled workers are occupied on every car: structural iron workers, sheet metal workers, pipe fitters, glass fitters, electricians, carpenters, cabinet makers, upholsterers, painters, and varnishers. In the type of car built in this plant, there are about 700 operations in the erection of each car, without including the many operations necessary to prepare the parts for erection.

It is obvious that these operations must be carefully co-ordinated, because one cannot be begun until the preceding is completed, and a delay in one causes delays

in the hundreds which follow. In production of this kind, it is especially important to reduce the erecting time to a minimum; first, because there is a large investment in material and labor in the car which cannot be charged to a customer until the car is completed and delivered; and second, because the overhead is necessarily high due to the special type of buildings required, the equipment for moving and lifting cars, and the various kinds of service needed. Production is usually limited by the track space in the erecting shops, and therefore, the longer the car stands on the tracks, the lower the production will be.

Planning for One Day

The first step was to show each foreman how to plan his work one day in advance. His men were occupied in small groups, sometimes on 20 cars at the same time, and what each group could do next depended on whether or not materials and parts were ready, and on the progress made in preceding operations by other groups of skilled workers. It was difficult for a foreman to keep all this information in his head, and he frequently made mistakes of judgment as to the comparative importance of the various operations.

The foreman and his clerk quickly learned the technique of planning one day in advance, assigning workmen in accordance with that plan, and providing them with the materials, parts, and tools required. It immediately became apparent that the workers wasted a great deal of time going to the storerooms for materials and tools, and therefore the foreman assigned this task to one or two unskilled workers who reported to him any shortages before the workmen were instructed to begin their operations.

Within a short time, the foreman found that since he spent an hour each afternoon with his clerk in planning the operations for the following day, it was not necessary for him personally to tell each workman what he was to do. Therefore this duty was assigned to the clerk, who brought to the attention of the foreman only those cases in which something prevented him from following the agreed-upon plan.

The foreman also delegated to the clerk the duty of signing requisitions for material and other routine paper work. In this way the foreman was relieved of all clerical work and the duty of telling each workman his next job, and was left free to inspect the quality of operations, to train his men to do their work better and in a shorter time, and to remove the obstacles which stood in their way.

This planning for one day at a time revealed many differences of opinion among the various foremen as to what the operations should be and their proper sequence. In many cases, these foremen did not agree with the instructions of the engineering or designing department.

The arrangement of machinery and material in this European shop is similar to that in many typical plants in this country

The organization of a central planning department for the entire erecting shop was therefore begun, which undertook to revise the authorized lists of operations and to secure an agreement between the engineering department and the foremen as to what these operations should be. At the same time operations that covered several days were split into smaller units, not exceeding eight hours, in order to make it easier to follow progress.

The central planning department then collected the available information as to the time required for each operation and determined their proper sequence. This information was then entered on a standard Gantt layout chart for a typical car, drawn on a time scale, which showed when each operation should begin, how much time it should require, and how many workmen should be used. This chart was duplicated, and whenever a chassis was brought into the erecting shop, the date was entered on the chart, and that automatically set the time for the beginning of all operations. This of course greatly

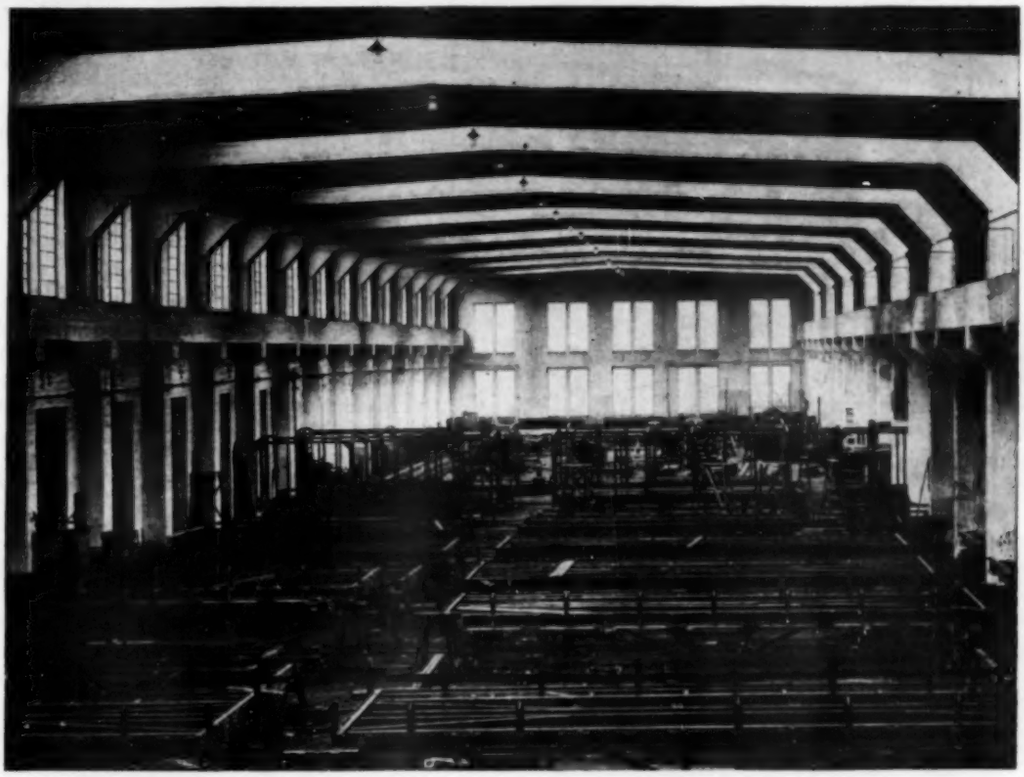
simplified the daily planning of the foreman. The progress of work was entered on these charts, one for each car, and as a result the superintendent and his staff were able to concentrate their attention on removing the delays that would eventually postpone the completion of the car.

When the central planning department had in this way scheduled the movement of all cars through the erecting shop and had co-ordinated these general plans with the detailed plans of foremen, it was able to tell the subsidiary departments when the various parts would be needed. This information was given to the machine shop, the upholstery shop, the carpenter shop, and others, in chart form showing the parts, the quantities, and the dates when they would be required for assembly. The information previously given had been inaccurate because the erecting shop had not known very far in advance when the various operations would be performed.

In this way the support and co-operation of workers was secured, and it was not long before they began to ask the observers to study their operations next. The work became more interesting for skilled men, because those parts of their tasks which did not require their particular skill were assigned to untrained men; the skilled men were able to devote their entire days to operations at which they were particularly efficient and for which they could be better paid. Thus the shortage of skilled labor that had previously existed was overcome, and both production and the earnings of workers increased.

Subsidiary Departments

When the erecting shop sent the schedule charts to the various subsidiary departments, a basis was provided for planning their work; methods are now being installed which resemble those used in the erecting shop except that the work is planned by machines instead of by groups of men. The movement of parts is being planned not only through the machine shop, for example, but through the foundries, forge shop, and other departments which work on raw materials.



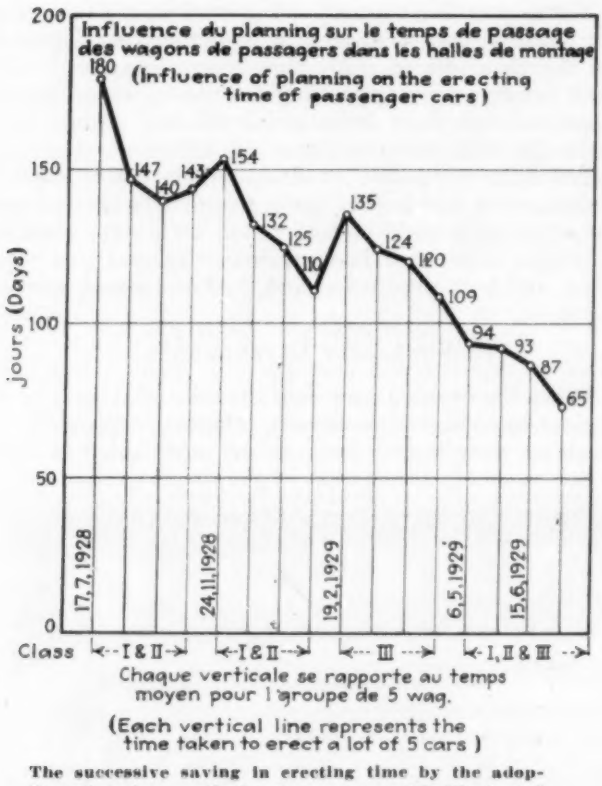
The orderly arrangement of the structural shop gives evidence of good housekeeping and efficient operating conditions

Soon after this planning was begun, it became apparent that the operations themselves could be simplified and better methods used. Several men were therefore trained to observe the existing methods and improve them. Better tools were provided; supplies, such as screws and bolts, were arranged in containers for each operation; templates were made so that subsidiary departments could prepare parts so accurately that there would need to be no fitting in the car; a more rigid inspection of parts was established to avoid loss of time in assembling.

The over-all time for operations was recorded, but no stop watches were used in any of these studies. The men selected to be observers were chosen for their tact and fairness as well as for their technical knowledge. The workmen had previously been paid by piece rates, and when an operation was simplified or improved, the new rate was invariably set so that the workers' earnings per hour would be greater than formerly.

The methods of storekeeping and purchasing are also being revised, in order to bring the parts to the erecting and subsidiary shops when they are needed, but not so far in advance that the investment will be larger than necessary.

The introduction of planning and the improvement of methods of direction revealed the need for many physical changes in the plant. The majority of these changes were aimed to reduce the labor cost of handling material, and they consisted of the construction of smooth concrete floors on which trucks can be easily moved; the rearrangement of machines in order to shorten the distance material must be transported, and in order to provide straight aisles for electric trucks; the building of



The successive saving in erecting time by the adoption of modern methods of management is illustrated graphically

concrete roadways between the shops; the installation of additional material handling equipment; and many similar physical improvements.

At the present time, the planning methods have been only partly installed in the subsidiary shops, the improvement of their operations only recently begun, and therefore the full benefits have not yet been realized. In the erecting shop, the first department in which the new management methods were installed, the results are more apparent.

For the first group of 5 cars completed after our work was begun, the average erecting time was 180 days. On each succeeding lot, this time was reduced, because of the introduction of planning methods. At the end of the first nine months, the time had dropped to 110 days and now, after a year and a half, it has come down to 65 days—a little more than a third of the former erecting time.

The value of the production for the year has increased one million dollars over the previous year, and this has been done with the same number of men and only small investments in equipment. Reductions in cost of production have also been large, but there is no accurate measure of these savings because the new costs are on a different basis from the old methods.

However, there are records which indicate the savings occasioned by improvements in the erecting operations. Three-quarters of the carpenters' operations have been studied and the average reduction in the time allowed has been 25 per cent. In varnishing operations the reduction has averaged 13 per cent.

The earnings of skilled workers have been increased through providing them with better tools, teaching them improved methods and eliminating delays. The workmen have taken advantage of these better conditions and have steadily increased their output, so that during the first six months of the year, the average weekly earnings increased 24 per cent. This average covers all producing departments, but the erecting shop itself was above that average. The quality of workmanship on the cars has so far improved that there are practically no delays caused by work not passing inspection. Delivery dates have been set far in advance and these promises consistently met, which has eliminated the payment of penalties for non-delivery of cars within the contract time.

It may be interesting to note that throughout this work we have met comparatively little resistance among executives to planning or to raising the wages of workmen. There are two managers, and a few instances may indicate their attitude towards these new methods. In a discussion with another executive one of them said: "The thing we did not understand at first was that these methods must be taken as a whole. We cannot say that we will accept one part and not accept another, for we have not seen the thing work as a whole. Now, however, we have seen in the erecting shop how everything ties in together, and features which we thought unrelated are now part of a closed circle."

The other manager, who is in charge of production, came into a room where one of the members of the installation crew was patiently meeting various objections to changes in purchasing and storing methods. This manager said to the chief of the purchasing department: "You are losing time haggling over details; I believe in these methods as I believe in God."

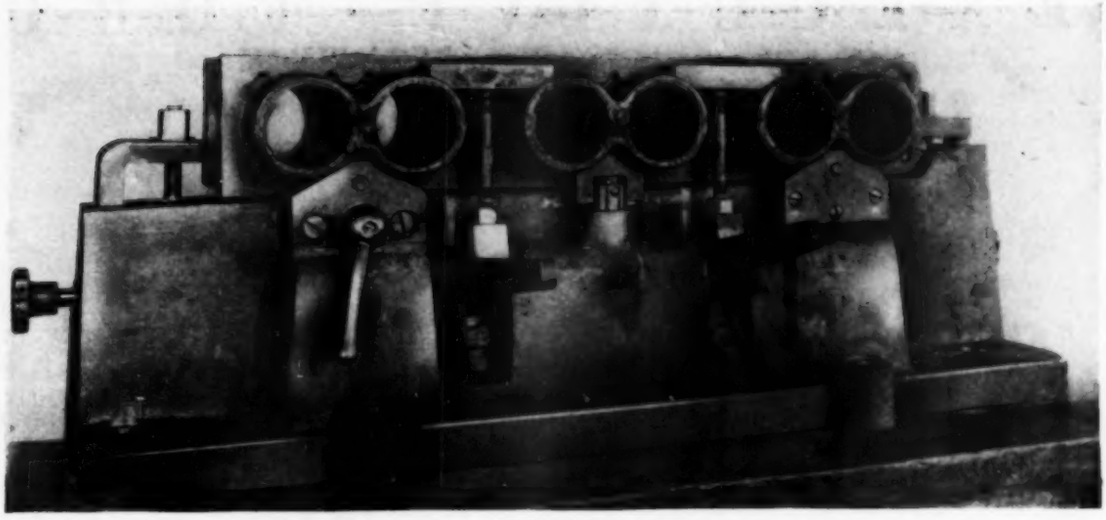
With managers of this type, open-minded and decisive, European industries can move at a rate formerly considered impossible, and can turn over their capital as rapidly as in well operated American plants.

Using Blind Ads—*Discussion*

By W. Lestye
Manchester, England

BLIND ad disadvantages have been dealt with by Mr. Kruger on page 862, Vol. 71, of *American Machinist*, but the advantages have not been considered. The mechanic often does find difficulty in answering a blind ad, not because he is illiterate or unintelligent, but simply because to him the "mike" is mightier than the pen. Even for the foreman and executive a pronounced difficulty exists, since the answer requested in an ad is often difficult to express with the small amount of information given. In answer to the stereotyped, "state age, wage, and experience" he can easily give his age; but how about the other two items? The wage must depend to some extent upon the size of the plant, character of the work, and type of men, as well as other items unexpressed in the ad, while only certain bits of experience are of any value in applying for the specified position. Both of these problems should be decided in the interview, not in the letter of application.

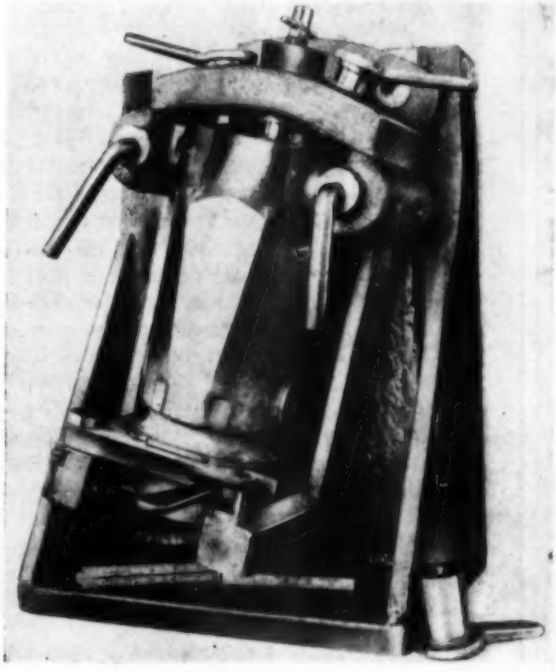
In many shops, blind ads are timesavers. If the company employs no employment officer, it is easier to read a hundred letters and pick therefrom those few which are satisfactory, than it is to interview half as many men. The objectionable items in the average blind ad should be taken up in the interview anyway. The ad should state the location of the plant, the approximate size of the department, and the sort of man wanted. Then the answer can be made intelligible.

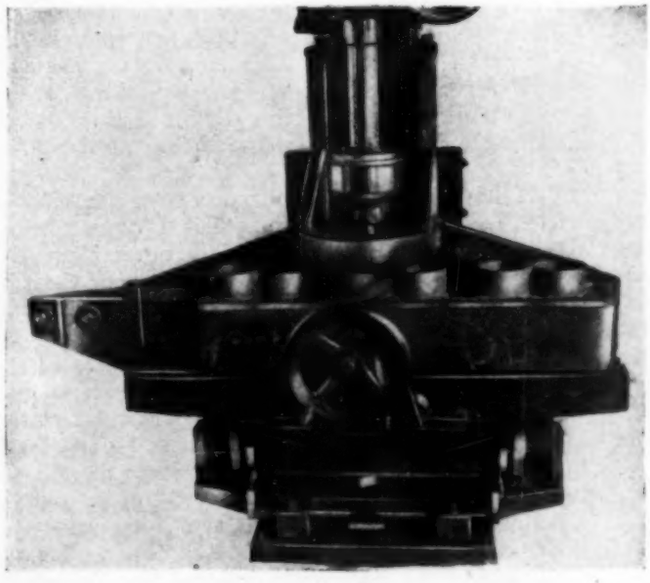


More Tooling on the West Coast

AT THE TOP is shown a fixture for holding a cylinder block while the upper end is being milled. The work is located by two inverted V-blocks near the ends of the fixture. One V-block is of the floating type, the other stationary. The work is held by two cam clamps operated by levers

AT THE RIGHT is a jig for drilling and reaming valve stem holes in cylinders. After one hole has been drilled and reamed, the work-holding section is swung to bring the work into position for the other hole. The cylinder is held by a swinging clamp having a cam-operated lock





AT THE LEFT is shown a jig for drilling and reaming the cylinder heads of air compressors. The work is piloted by a cupped ring that is raised vertically by a cam, so that it also acts as a clamp

Photographs by courtesy of the Standard Die & Tool Company, Berkeley, Calif.

EXECUTIVE · FORUM

Who Should Do the Firing?

THE INSPECTION of a well laid out, well kept plant is always a source of pleasure to the industrial-minded executive. The Channing Metal Works is such a plant. William Holland, although he had known Channing's personnel for some years, was making his first tour of inspection with Frank Craig, works manager. These two had spent half the morning looking over everything from pattern shop to shipping department, and Bill was as pleased as a child with a new toy.

As they were leaving the gate to cross to the main office, a man in workman's clothes approached Craig. "Mr. Craig, could you spare me a minute?" he requested.

"What is it, Jones?" Craig asked, recognizing one of his milling machine operators.

"You have the reputation of giving everyone a square deal," Jones went on, "and I don't think I've gotten one. Last night, Ed. Barrow, the milling foreman told me I was through. He was sore because I spoiled one of the compressor castings, and let me go without notice. I admit I made a mistake, but I have worked here eight months and I feel I deserve more consideration. It doesn't quite set right—the way it was done."

"I can't go into the merits of this question now," advised Craig, "but see the employment manager tomorrow morning. In the meantime I'll have a talk with him and Ed. Barrow too."

When Jones departed, Bill Holland asked, "Do you still permit foremen to fire men on the spot without notice?"

"Yes, I do," Craig admitted, "and in ninety-nine cases out of a hundred it works O.K. Occasionally, a man comes to me with a grievance, as Jones did just now. I do not want to pass on this particular instance without further investigation, but I happen to know that this was not his first offense. I expect to find that Ed. Barrow, after several warnings, gave up trying to make a milling machine hand out of Jones. The compressor casting was probably the last straw, and Ed. lost his patience."

"But you have an employment department," Holland pointed out. "Why not let it handle firing as well as hiring?"

What Do You Think About This Executive Problem?

The foreman's word was at one time absolute in his department. Successive inroads have been made on his powers; his functions have been divided. But many a foreman has jealously guarded any infringements on his direct authority over his men.

Should the foreman's say on firing be final? Do scientific methods, delegating this responsibility to others, result in improvement, or do they weaken shop discipline? Submit your ideas on this subject to American Machinist. Contributions published will be paid for.

"I have always felt that keeping the firing power in the foremen's hands gave them greater prestige in the eyes of the men. The employment manager is useful in selecting new men and O.K.'s all dismissals. This approval is merely a rubber stamping process. It seems to me, that compromising the foremen's right to dismiss their men would somewhat undermine their authority."

"I have no wish to influence your plant policies," commented Holland, "but I cannot help thinking of the methods used in other plants I have visited. Until a few years ago, your theory was universally used, but recently a great deal of thought has been given scientific labor handling. There are many reasons why a man may not get along in a certain department—differences in temperament, unsuitability for a particular class of work, and so on. In many cases he may become an efficient employee elsewhere in the plant. Modern employment methods attempt to make certain that a man's services are of no value to the company before turning him loose. Labor turnover has been greatly reduced in this way."

DISCUSSION

OF PREVIOUS PROBLEMS

Sales or Sincerity?

A company, that has difficulty with its delivery dates, should establish a strict policy regarding them. This policy should determine the final authority in setting the delivery date, the attitude in fulfilling the date, and the features to be emphasized in the sales argument. An early delivery date is not the only feature to be stressed in making a sale, because design and quality of product may be the more potent argument in landing the order. However, if normal delivery dates are consistently out of line with competitors, an investigation might reveal that the production rate of the plant is too low. This is undoubtedly true when "all orders seem to be rush orders." Increase of facilities, increase of load factor, or subletting parts of the contract might solve this problem either partially or completely.

—M. F. SAXTON,
Allis-Chalmers Manufacturing Company.

Equipment Replacement in Slack Periods

When slack periods occur, it is necessary first to analyze the cause of this depression. To do this a board of directors must have its fingers on the pulse of the industry. A true value of the company's product must be known, as must also the possibilities of extending the market. After finding ample evidence of the basic soundness of business, a bold policy is advocated.

Almost every case where such a policy has been adopted has turned out successfully. During the past eight years, hundreds of firms equipped with obsolete machinery, after enjoying a long spell of prosperity, experience slack periods, and instead of tackling the problem boldly, drifted with the tide, and by so doing only helped the slump to increase. The only equipment bought in those lean years was second hand machinery which had weathered the rough wear and tear of the war.

Machine tool makers experienced the worst slump known, and now, when trade is on the upward grade, there is a brisk demand for their product. I know a firm that is receiving two or three new machines every day in order to cope with the volume of work. This has been going on for some considerable time, and it is evident that, if this firm had displayed faith in the basic soundness of business four years ago when they had a slack period, not only would their orders have been a Godsend to the machine tool maker, but all the loss entailed through orders being held up while the new machines were being installed would have been avoided.

—R. G. HEWITT, *Keighley, England.*

Fitting the Older Worker for His Job

My company lets old workers work on their machine-tools till they themselves ask for a job within their reduced physical limitations. They work on their machines, getting a fixed hourly wage, which is a little greater than the legal minimum hourly wage. If they ask for lighter work, we have always a place for them. For example, we train old men for the tool stores in our mechanical shops. This job suits very well the old workers, because they have much practical knowledge of tools in general, and besides, they can sit down in idle time. We have found that the workers in the production line very seldom have trouble to get the right tool, because the old chaps take pride in their administration job. These veterans are not afraid to give a sound wigging to the younger workers if they come along with broken tools.

One of our old mechanics is the doctor for all ruined keys and locks in the plant. Another has to nurse the numerous water and steam arteries in the plant. Further, we employ some old workers in light sorting work. Half a dozen old men are employed as watchmen. I must not forget to report that also, in our plant, we have developed a "flying squadron" of old men for cleaning machine tools and for other cleaning work in the shops. I fully agree with Mr. Holland that older men can fill a lot of jobs in the shops and I add, that they earn their wages, if we take care to find out the right place for them.

—FRANZ BERMANN, *Supt. Locomotive Factory, Austria-Hungarian Licensed Railway, Vienna.*

To Whom Should the Chief Inspector Report?

This question has disturbed the equilibrium of many engineering firms. Having seen many inspection departments and their workings, I am of the opinion that the chief inspector should report directly to the principal, and be a member of the office staff, entirely separate from the works staff.

Although he should not come under either the superintendent or engineering department, he should certainly confer with them as well as with the various foremen, especially those in charge of the assembly departments.

—ALFRED COOK.

Is Budgetary Control a Cure-All?

Control over the operation of a particular department of a business is difficult to maintain unless it is linked up with corresponding control over departments with which it must mesh in the drive toward business progress. Budgetary control supplies the co-ordination between department plans. The budget idea in business implies the forecasting of tomorrow, and the laying of co-ordinated plans for leading all major portions

of the business along paths that will cross and diverge at predetermined points. Business foresight is largely hindsight. Budgets must not only be developed by means of forecasts of conditions as they affect the particular enterprise, but on the basis of past history, carefully studied and interpreted. Current market trends should be fully considered.

The budget immediately secures co-ordination of departments, particularly a co-ordination of the sales, production, and financial forces. Departmental schedules can be set up for detailing the lists of expenditures, giving their relation to the various items of product and to the business as a whole. Cost figures can be collected to serve as a check on the developed budget. Finally, a financial program may be evolved to furnish a chart for the pilots of the enterprise, as they guide their business through the storms on the sea of industry.

—HARRY KAUFMAN, *Public Accountant, Philadelphia, Pa.*

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Should Special Work Be Segregated?

No! Special work should not be segregated unless there is enough to keep a special department set up for this class of work from one end of the month to the other. I've had occasion to try out this idea, and I've found that it seriously interferes with the regular production. In the plant where I was engaged when this problem arose, we were manufacturing automotive equipment a large percentage of which was special. The orders for special equipment did not warrant a special department, and there was no telling when we would receive a large amount of these orders, as they were only received spasmodically.

After a good deal of serious thought, we tried out the following idea which proved very successful. We checked over all of our orders for the past two years and determined that the special work amounted to about 20 per cent. We then arranged our production program so that our entire amount of standard equipment would be moving along at a set rate each day without any interference. As this work covered 80 per cent of the program, there was still 20 per cent of our shop equipment left open for emergency work, or special orders. In every plant where automotive equipment is manufactured a certain percentage of the machines is set aside for stock orders. In our case, 12 per cent of the 80 per cent of machinery on standard orders was used for this purpose. This could be turned over to the manufacture of special orders at a minute's notice, without seriously interfering with the regular production. If the 20 per cent of our shop machinery held open for special orders was not occupied with the manufacture of special work, this machinery was turned over to the manufacture of stock orders.

—FREDERIC A. J. SCHMIDT, *Industrial Engineer, Plainfield Manufacturing Company.*

Who Should Do the Estimating?

The foreman has the most experience on work done in his department, and has therefore the best data on which to estimate the time required for a job. Conditions of manufacture change so rapidly that, even when the office estimator has had actual shop experience, it is likely to be out of date and no longer a safe guide. Further, the office man may estimate on one way of doing the job, and the foreman follow a different method which possibly will entail a considerable difference in cost.

It is not only a question of machinery, but also of men; certainly the foreman is much more likely to have a better knowledge of the productive powers and rates of his men than the office estimator. Another factor, in favor of having the foreman estimate the time, is that he will thereby have a stronger sense of responsibility for keeping within the estimate.

Let us be fair to the foreman when his estimate is liberal in our judgment, by recognizing that he has a vivid and extensive experience of the accidents and maladjustments of men, machinery, and circumstance that are sometimes not allowed for in our often incomplete theories and calculations. Be it remembered that liberality is frequently a protection to the company as well as himself, for no concern can long endure on orders taken at a loss.

The collection, calculation, and compilation of estimates is better done by an experienced clerk, or a technical man, preferably the latter, if the concern is large enough to make his employment profitable. The technical men, by friendly co-operation and experience, would probably be able to act sometimes in an advisory capacity to the foreman as to a possible better way of doing the job besides checking his estimates. Each should be responsible for his own part of the work. However, a degree of joint responsibility has the advantage of tending to ensure the maximum co-operation.

—J. J. WOFFINGTON, *Leamington Spa., England.*

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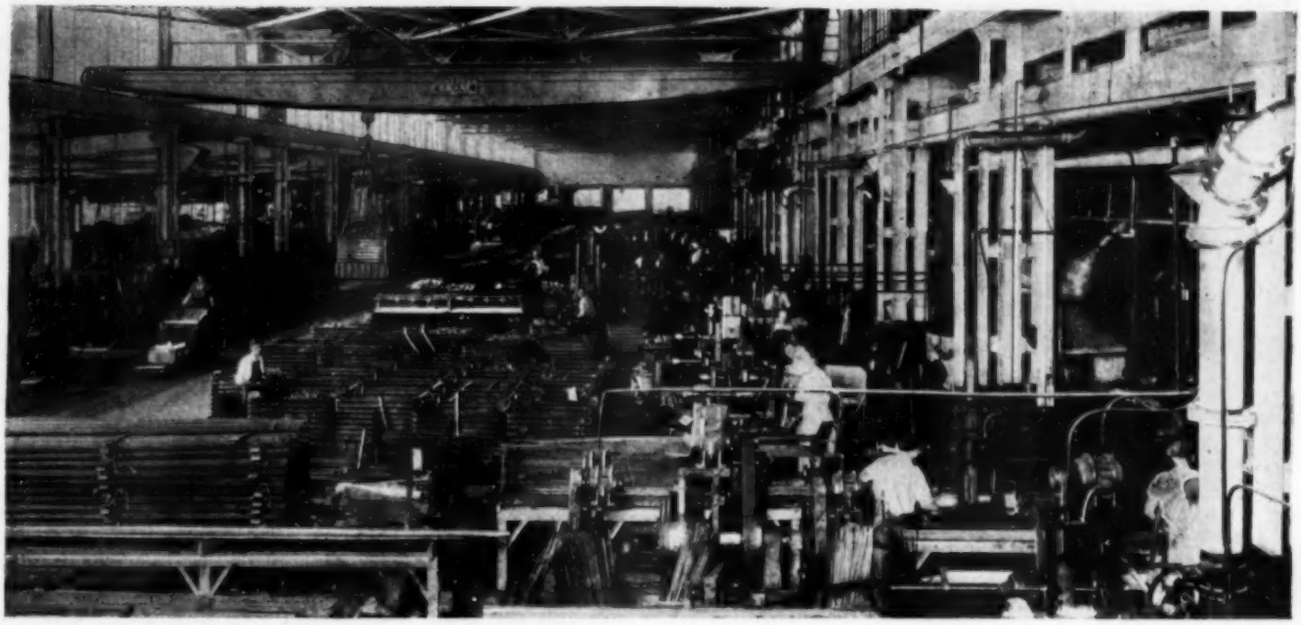
What Price Titles?

To some persons a title is a valuable asset. It serves to stimulate their ambition, and they strive for better things. A title such as vice-president always carries social prestige, and social prestige is a boon to the happiness of some persons. But the prestige soon wears out if the salary is not in keeping with the title.

If titles are to be sold, why not call the foreman, assistant superintendent instead of giving him a raise, and let it go at that? Of course he wouldn't be getting any further. He would still have to drive his flivver, but he might be so elated over his title that he would imagine he was driving a Rolls-Royce, providing he had a super-imagination. High-sounding titles are all right in their place, but they have no place in industry.

—W. J. OWENS, *Foreman, Newport Rolling Mill.*

General view of the Gemmer plant



Steering 6,400 Steering Gears Through Manufacture

By J. B. NEALEY
American Gas Association

AN INTERESTING example of straight-line production is furnished in the plant of the Gemmer Manufacturing Company, Detroit, Michigan. This concern specializes in automobile steering gears, and with the highly efficient plant arrangement now enjoyed, has produced as high as 6,400 units daily for varying periods of time.

Raw material is received on a spur track inside the building, which measures 200x700 feet. The final assembly line parallels this track on the opposite side of the building. Running between these two, and across the building at right angles, are the various groups of machines arranged in lines, each machine selected for the production of some part of the steering mechanism. These lines of machines are so located that they meet the assembly line at the proper points for the parts made by them to be incorporated in the final assembly in correct sequence. Cars of raw material on the spur track are spotted opposite the right lines so that material handling here is minimized. Space is left between the cars and the ends of the production lines for storage of raw materials.

Departments for making the various parts are arranged in the following sequence. The kind of material used is indicated:

1. Steering column	steel tubing
2. Adjusting nut	steel, S.A.E. 1,020
3. Worm	" " "
4. Housing	malleable cast iron
5. Shaft	steel S.A.E. 1,020 and 2,315
6. Cover	malleable cast iron
7. Ball arms	steel forgings
8. Controls (throttle, spark, dimmer)	steel tubing (die-cast levers)
9. Jackets	steel tubing

There are from two to nine lines of machines in each of these departments, and it takes a little over an hour and a half for the average part to be converted from raw material and to reach the assembly line in finished form. Most of the handling, from cars to temporary storage and from there to the production lines, is accomplished by means of a five-ton traveling crane that runs the entire length of the building. Boxes, spotted among the machines to receive turnings, are dumped into an open top freight car at the end of the spur. On an average, one car of turnings is accumulated by the plant daily.

The tool room, tool crib, and various other departments are located in a bay on the side of the spur track opposite the rest of the plant, a location convenient to the

Steering gear shafts are heated in this forging furnace for upsetting in an adjacent machine

production departments. The machines in the various departments are as follows:

1. Cutoffs, swagers, threaders, special and automatic screw machines
2. Drill presses, grinders, automatic screw machines
3. Broachers, hobbers, screw automatics
4. Drill presses, special multiple drilling and tapping machines, millers
5. Hobbers, millers, lathes, threading machines, grinders, upsetters and gas forges
6. Multiple spindle lathes, for boring and reaming trunnion holes and facing cover, all in one operation, presses for pressing in bushings, drill presses, lathes, millers
7. Special bending machines and gas furnaces for heating the stock, lathes, drill presses, presses, broachers
8. Cutoffs, swagers, knurling machines, presses
9. Drill and punch presses, polishing machines

The shaft is upset from bar stock after being heated in a gas-fired forge. This furnace is of the slot type, is 9 ft. wide, 3 ft. deep, and 4 ft. high, set on legs. Heat is supplied by two gas burners, one firing from each side above the work. This furnace is built of brick, steel encased, and holds 52 pieces of stock at a time. A blast of air from a pipe just under the lip of the slot carries escaping heat up under a hood and so betters the working conditions. One operator runs the furnace and serves the upsetter. Three thousand pieces of stock per day can be handled with this layout by working day and night shifts.

Various steels capable of giving the desired physical characteristics are used for the ball arm. S.A.E. 1,025 and 1,035 are most generally employed. They are held to a five-point range in carbon on the high side. These parts are received as forgings and, after machining, are heat-treated in gas-fired furnaces.

The heat-treating department is equipped with a variety of gas furnaces among which are two rotary hearth units each of which is 9 ft. in diameter and 5 ft. high. Built of brick and incased with steel, these units set stationary on legs, while the circular hearth, which is mounted on rollers, rotates within, thus making continuous operation possible. The roof is supported by a pier running through the center of the hearth, which is held on a cast iron base. Teeth cut in the periphery of the base mesh with a driving gear.

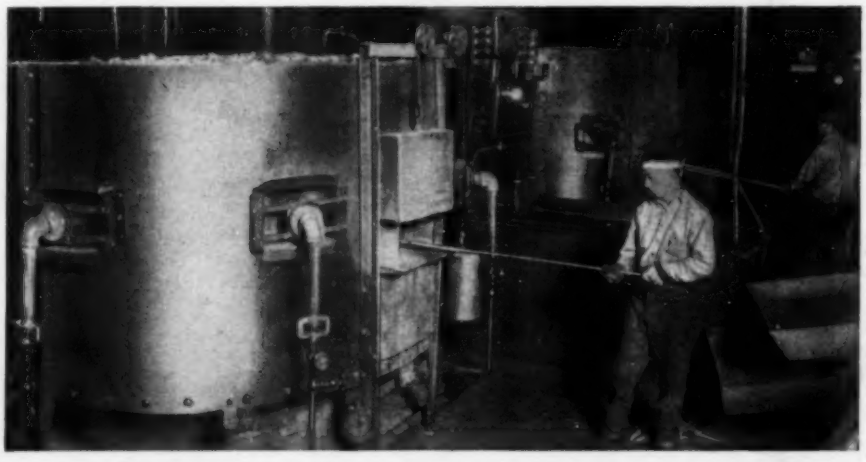
This unit is heated with six gas burners, firing against the center pier which is composed of refractory material and is brought up to incandescence to make possible the most rapid heat transfer. The burners are supplied with inspirators or gas-air proportioners so that any furnace atmosphere, reducing, oxidizing, or neutral, can be obtained and maintained according to the class of work being treated. The temperatures are maintained automatically by a control hooked up with a recording pyrometer.

A single opening in front is used for both loading and discharging. When the work has traveled through the circumference of the furnace back to this opening, it runs against a guide rail that causes it to move out through the door and to fall into a quench. As the hearth is driven through a speed-reduction gear train, its speed of rotation can be so adjusted that the work will remain in the furnace during the exact time cycle required. These furnaces can be set for any heat or time cycle and are suited to many kinds of heat-treatment.

When the shafts have been treated in one of these units, they receive further treatment on the end by drawing in lead. The set-up of quenching and gas-fired hot water tanks and furnaces is unique. The shafts are discharged from the rotary furnaces into a cold water quench and are brought up out of the tank and discharged into a hot water quench by an elevator conveyor. A similar conveyor brings them up out of the hot water quench and onto a slat-type conveyor which takes them to the two, lead-pot furnaces. A blast of air plays on the shafts while on this last conveyor. This combination of air and heat drys the work by the time it reaches the end of the conveyor. The hot water tank is heated by a single gas burner. One motor runs all three conveyors through speed-reduction gear trains.

Cyanide furnaces are of brick and are four feet in diameter. They have a steel shell and contain pots which are heated by four gas burners. Each is equipped with an automatic temperature control and an indicating

Rotating-hearth furnaces used for heating shafts prior to quenching in the tank shown. The controlling and recording pyrometers are at the extreme right



Gas-heated lead pots for drawing operation on steering gear shafts

pyrometer. An overhead monorail with air lifts serves this department. A similar set-up, with gas-fired, lead pots instead of cyanide, is used for treating the shafts. These also are supplied with automatic temperature controls and indicating pyrometers.

Ball arms are heated for bending in three gas-fired, forging furnaces one of which is of the rotary type similar to the two just described for heat-treating. This one is smaller, however, being 5 ft. in diameter and 2 ft. high. Only three gas burners are required to maintain the proper forging or bending temperature. The other two are of the slot type, 4 ft. wide, 2 ft. deep, and 4 ft. high, setting on legs. They are of brick, steel encased, and are heated by two gas burners, one firing from each end beneath the hearth.

The final assembly line is provided with three types of traveling conveyor, the first being the flat plate type, which receives the steering column, the first unit in the final assembly. Various machines for assembly operations are lined up alongside the conveyor. The second conveyor is of the same type, except that it is equipped with special fixtures for holding the assemblies in place. Shafts, covers, and miscellaneous parts are added here.

Midway of this conveyor is an overhead, monorail, take-off conveyor arranged in a closed loop. The assemblies are side-tracked on this unit to a point where operators make the necessary gear adjustments and are then returned to the point of origin. The last conveyor is equipped with hooks on which the assemblies are hung. Following this they are dipped into paint, and the length of travel is regulated to give them time to dry.

Completed assemblies are placed on racks, 200 to the rack, and moved by lift trucks to the shipping room. Some parts, such as controls, jackets, and ball arms, which are not added until the assembly is placed in the automobile, are boxed and shipped separately. The shipping department has a depressed spur track so that the floor is on a level with that of the freight cars.

The conference method in safety work has been evolved by the Chrysler Corporation in safety committees of the plants of the company. These committees have discussed over 6,000 items, held hundreds of meetings, and have cut accident costs to a remarkable figure. The object of the committee is to get men to think, and the corporation is sold on the idea that this cannot be done by too much talking on the part of the "safety man" himself.

Welded Automobile Bodies and the Oxy-Acetylene Torch

By Joseph W. Meadowcroft
Assistant Works Manager,
Edward G. Budd Manufacturing Company

GIVING due consideration to the leading methods of welding applied in the production of all-steel automobile bodies, the oxy-acetylene torch surpasses thus far in usefulness all other methods in our plant. When correctly and intelligently applied, it is today unrivaled and can be termed a universal tool with an almost unlimited scope in all branches of this industry and many others.

The all-steel automobile body, as it is produced by the Budd company would be an impossibility if the oxy-acetylene torch were removed from any of the most minute operations in its manufacture. The torch performs its first important function in the steel stores department. Here the various steels of low-carbon content are cut from stock as requisitioned, and boiler plate of various thicknesses is cut to correct dimensions.

In the machine departments, the torch adapts itself to engineering changes and to salvaging steel die parts that would otherwise be scrapped. Its flexibility permits its application to broken tools in active service and prevents lengthy delays that would ordinarily require the holding up of a machine for a change of tools. In this sense, it is instrumental in maintaining schedules as they are planned. Further, it is quite adaptable to welding the newer alloy and stainless steels. While many of these steels are subjected to air-hardening when brought to critical heats, it is possible to return the material to its original annealed state, solely by the use of the welding torch and the proper control procedure. Welds made in this way are practical and permanent as well.

A large percentage of stampings with slight defects may be reclaimed in the stamping inspection department with this tool. Chief among the imperfections which cause rejections are those resulting from improper placing of the blank in the forming die, the slipping of the blank during formation, or the breaking of an improperly annealed sheet.

In the unit and final assembly departments, many operations formerly done with the welding torch are now taken care of by other methods. Most prominent among these are the electric resistance flash weld and the electric resistance spot weld. It is true that much has been accomplished by these two methods, but regardless of the length of the seam, we find the welding torch useful for final welding to permit correct finishing. The unit assembly departments find the flexibility of the torch of great advantage in tacking together smaller units into a correctly aligned larger unit in an assembly jig. Reduction in the number of jigs required, and in the floor space needed, is realized in both unit and final assembly departments. Oxy-acetylene welding is as yet unequalled in respect to flexibility in performing all operations after final assembly on our moving conveyor. Thus, throughout our plant the light weight, flexibility, and general utility of the oxy-acetylene torch places it in a class not yet attained by other welding tools.

Truck body and passenger car assembly plant of the General Motors Company of Japan at Osaka

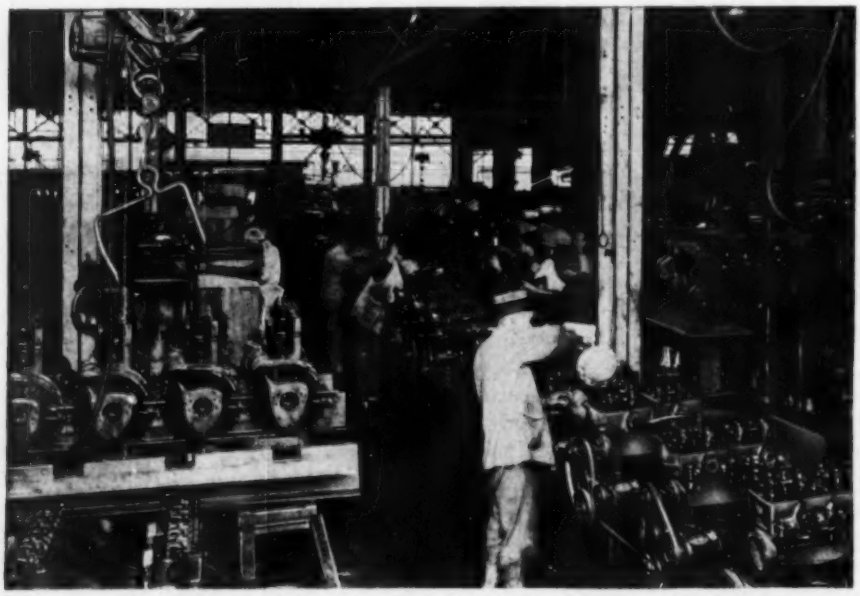
Assembling American Cars in Japan

By Fred H. Colvin
Editor, American Machinist

ASSEMBLING automobiles 8,000 miles from the factory in which the parts are made is one phase of the enterprise that has characterized the American automobile industry for many years. By building that industry into the country which absorbs a share of its product, freight charges are reduced, a lower tariff usually is secured, and many other benefits accrue. An excellent example of a plant conducted on this basis is that of the General Motors Company of Japan, at Osaka, where about 1,500 employees are turning out a goodly number of the various makes of the cars of that company. The Chevrolet naturally heads the list by a wide margin, because of its moderate size and low price.

Up to the present time practically all of the mechanical parts of General Motors' cars have been made in the United States and shipped to Osaka. The methods devised for packing and boxing so as to minimize space, and at the same time to secure ample protection against damage, might well be studied by makers and shippers of other kinds of machinery. Passenger car bodies are built up in Osaka from sheets formed in the States, because the heavy cost of body dies makes it uneconomical to do this work in Japan as yet. Commercial car bodies however, are built at Osaka, and it is quite probable that more and more of the many parts that enter into automobile construction will be made in Japan as the years go by. Proper materials and quantities that warrant sufficient machine equipment for economical production are all that are necessary to insure manufacture in or near Osaka.

Fig. 1—Engine line nearing the point of chassis assembly



Some idea of the size of the Osaka General Motors plant can be had from the headpiece. The section behind the test track is the one in which chassis and the passenger bodies are assembled. At the left is the newer plant where truck bodies are built and mounted.

In the assembly plant are seen many earmarks reminiscent of Flint, Michigan, and other automobile centers. The view in Fig. 1, for example, shows a line of engines on their way to the chassis at the other side of the shop. At another point assembled rear axles are stored

within convenient reach for attachment to the frames, as shown in Fig. 2. Here the rear axle is bolted to the springs and the springs to the frame, with Alemite connections in place. The chain and pulley on the hoist above permit the frame to be rolled over easily after both axles are in place and the frame is ready for the engine.

Meanwhile the upholstering department is preparing cushions, curtains, and other trim. Open cars are still fairly common in Japan. Singer sewing machines are used to good advantage by Japanese women. Before the upholstery reaches the assembly floor, however, the body stampings are welded into proper combinations for doors, back and side panels, and are fastened into place over the wooden frame that has also been assembled into units for body, doors, and top. Power-driven screw drivers supported on light jib cranes, as shown in Fig. 3, make it easy to fasten various parts together as the body progresses towards its final shape.

A little farther down the line the doors are hung, the top and its covering begin to go into place, the final finishing of the metal body takes place, and painting begins. Fenders have previously been rubbed down, enameled, rubbed again, and given a final coat of enamel that is baked on in a continuous oven. After fenders are assembled to the body, the final painting is done. Striping is added by men who seem to take a special pride in doing a high class job on a low priced car. After interior trim is tacked in place the vehicle is ready for final inspection, as Fig. 4 indicates.

It is interesting to note that, with the exception of the production manager and his assistant, evey shop executive and worker in the shop is a native of Japan. This indicates both skill and adaptability, for, with minor exceptions, work of this kind was new to Japan and to the Osaka district only a few years ago. The success that has been attained reflects great credit, both upon the management and upon the efforts of the whole personnel.

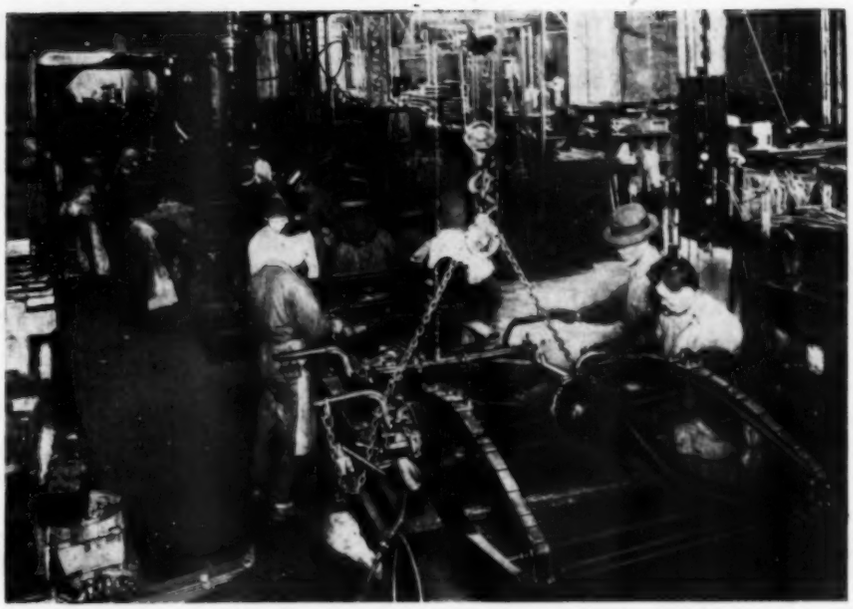


Fig. 2—Assembling axles, springs, and other parts to inverted frame

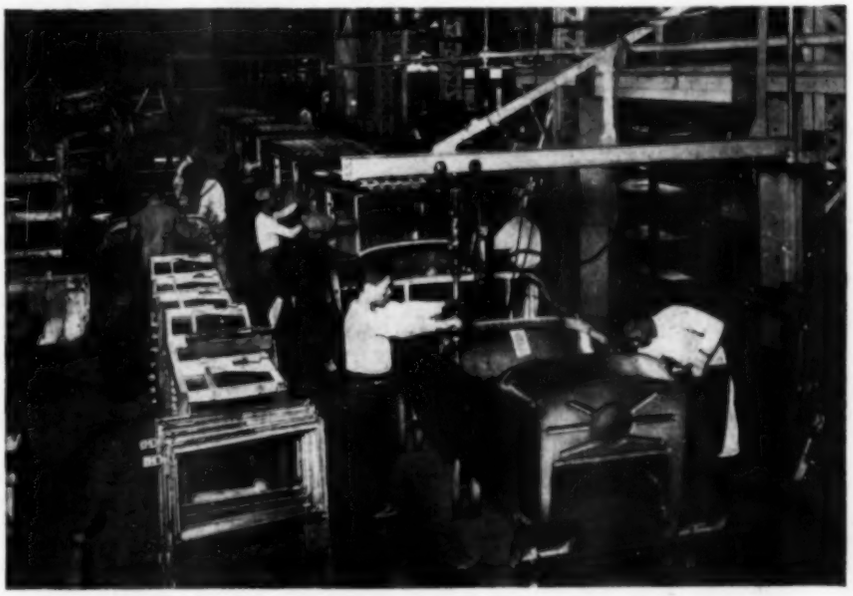


Fig. 3—Assembling bodies from stampings shipped from the United States

Fig. 4—Final inspection of a complete Chevrolet car

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions given at the foot of the page have been arranged

Boss, or Advisor?

AL WAS sitting on his front "stoop" whittling, so preoccupied that he didn't notice Ed until the latter boomed, "Hey come out of it! What's eating you?"

"Oh, hello, Ed. Come on up and sit down. I was just thinking a little."

"Darn little, I'll bet! What did you get out of the unaccustomed exercise?"

"Do you know Tom Mason, Ed?"

"Do I know Tom Mason? Why, we used to go swimming together!"

"No, I mean young Tom, Ed."

"Say, Al, what are you trying to do, kid me? You know darn well he's my assistant foreman, and has been for six months past."

"Yes, Ed, I know all that, and don't get huffy about it. I just wondered whether you knew anything much about how he gets along with the men."

"As far as I know, he gets along fine. He doesn't put on airs and they seem to like him even though he watches them up to see that things are done on time, and done right."

"Well, Tom came over tonight on an errand for Mrs. Mason. You know, she and May are like twin sisters, and whenever one has company the other helps wherever she can. Tom came for some silverware, and while he waited, we were talking things over. I asked him how he liked his job after six months, and he said, 'All right, now'!"

"What did he mean, 'now'?"

"That's just what I asked him. He said: "Well, it's a long story. You know I'm pretty young to be an assistant foreman, and maybe I was feeling a little bit stuck on myself right after I got the job. Anyway, about the third day after I started I was walking through the shop and saw Gus—you know, the old lathe hand—reading a newspaper as he sat supposedly watching his machine. I walked up and told him that reading at work 'didn't go.' Gus turned squarely around to me and said, 'You go to the devil!' I was so taken aback that I didn't know what to say. Instead of going and telling Ed, I sat down behind a machine and tried to think the thing out. I began to wonder what made good old Gus fly off the handle that way. Then I began to wonder whether the trouble was with Gus or with me. It kept running through my head, and I began to realize that in my self-satisfaction at getting to be an assistant, I'd dressed, walked, and talked as though I was just about It. You know, my Dad always said that you have to be hard-boiled in handling men, show them you're better than they are, or you can't get any work out of them. Maybe that's why Dad was a foreman for twenty years, and had younger men going on up over his head all the time.'"

"But what gives you any thought out of that, Al? You know and I know that old Gus might just have been feeling a little crusty that morning."

"No, Ed, I don't think so. I kind of agree with the kid when he says that he's got a lot further in the last six months by trying to figure out the men and give them an even break, than he would have if he'd been a driver like his Dad."

"Well, Al, I don't think you're right. The kid is doing right well, but I think he'll find out he'll have to be a little bit tougher than his men to get anywhere."

What do you think about this problem? Should a foreman be the "Boss," or should he "give in" a little at times, and try to analyze his men and get their point of view?

Idea suggested by "Psychology for Executives," by Elliott Dunlap Smith.

Foremen are invited to discuss these questions vital to their work; of course the

DISCUSSION OF EARLIER TOPICS

What You Do, or What You Get Done?

ALTHOUGH Ed may have worked hard, himself, the results do not show up on the production charts. It is the total work accomplished by a department or gang that matters, and this is what the company will get paid for.

The charge hand, foreman, or departmental manager who concentrates on directing the efforts of others and leaves as little detail as possible for himself, will achieve far greater results than if he endeavors to handle a mass of unimportant details that can be just as well dealt with by an assistant.

But there are sometimes circumstances which make it necessary to attend personally to matters that we should like to leave to others. Take the case of starting a new section or department. With an incomplete staff and new labor, unless the man in charge can not only direct others, but can actually do the work himself if necessary, he will be a long time in getting to the stage where he can devote his time to the more important part of his job. —W. L. WATERHOUSE, *Staffs, England.*

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Learning from the Small Shop

MY EXPERIENCE and observations lead me to believe that, generally speaking, we are too much inclined to order special tools. This is especially true in the larger shops.

The average mechanic wants good tools, by which I mean expensive and imposing tools, to work with. Unfortunately, many of the foremen are as unwilling to use improvised tools as the men are. They do not seem to appreciate the cost of tools in actual dollars and cents. Of course, there is some justification for this in that they are removed from the financial operations of the company and therefore lose sight of values.

There are small shops that actually waste much time in doing work again and again in some crude way, when a special machine or some special tools would save their cost many times over. There are large plants, reputed to operate on a high degree of efficiency, where an enormous sum of money is spent on special tools, fixtures, and gages, which are used in the manufacture of comparatively few parts.

I have a case in mind where thousands of dollars were spent in making complicated tools and gages. Upon the completion of these tools it was found that they were impractical. Consequently, they were condemned and a redesign order was issued. The corporation where this happened, stands out as an engineering achievement in efficiency of operation. Let us mention at this point, that a small shop could not possibly commit such errors without serious consequences.

It will be evident that the shop alone is not in a position to answer such questions. It devolves, then, upon the management, the superintendent's office, the production engineer, methods engineer, or all collectively. It certainly is not the province of the foremen, neither that of the designing engineering department, to prescribe methods of procedure and tools to be used. The shop can and should be given the opportunity to use its knowledge and initiative, but in a suggestive capacity.

—GEORGE BELBES.

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Who Shall Be Laid Off First?

THE point to be settled seems to be: which is the most economical to the company, the low priced poor mechanic, or the higher priced good mechanic? Many times in the past I have seen managers go over pay rolls and pick out men that were "high priced," so that they might be let out during times of depression. Such executives were usually men who had graduated into authority via the sales or accounting departments. In some instances, inheriting their father's business, such men usually know little or nothing about manufacturing, and the fact that an employee is getting more than the average makes him seem a desirable man to get rid of.

The definition of a good mechanic implies that he is good not merely because he can do better work, but because he is also capable, by reason of his skill, of turning out more "low grade" work in a given time. There are some exceptions to this where the work is highly specialized, but generally this holds good. A good mechanic "knows his stuff," and oftimes can do a job, while a poorer mechanic is trying to find out what it is all about. The less skill a man has, the more it is necessary to pick jobs to suit his particular ability, but you can give a good man any job and be fairly sure of the outcome. Even if some of the low grade jobs do cost more when using the higher priced men, it would no doubt show a saving over trying to replace these men when required, and would be an investment in future preparedness and stability. You can expand an organization many fold if you have a nucleus of good mechanics.—WILLIAM E. HAMILTON, *Industrial Engineer.*

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Paying for Dependability

THE foreman, in his dealings with labor, is always conscious of the self-reliant man. He it is who takes his blueprint and instructions, and with confidence handles the machine as its master. The result is a perfect job, for he has trained himself to be precise in detail. Not so, however, with the "rusher." His main object is production, to make a passable attempt, and he cares not if someone else has to spend an hour or so on

discussion is not limited to foremen. Letters accepted and published will be paid for

finishing what he has neglected. Quality output never came from such workers.

It would be wrong to assume that all dependable men are slow. In the first place they study the job. They try and obviate all unnecessary movements, thus saving time. Secondly, they are careful about the tools they use. Only the best are good enough, and a wise foreman generally sees to it that they have them, because he knows they use them aright.

—W. LESTYE, *Manchester, England.*

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Should the Workman Share Responsibility?

FIRING should be a last resort not justified for a first or second offense. This workman could not have been considered a good man if he was spoiling work right along, and this case must therefore have been his first serious error.

The firing was the result of "might is right," with good judgment not prevailing. Both men had lost their tempers, and as Ed was in power, the workman lost out.

In the example given, the man was very little to blame. He had a jig that apparently fitted the casting, and no blueprint to tell him what was wanted. The responsibility in an ordinary case rests about evenly between the workman and the foreman. The foreman's part is to see that the job is set up and started right, and checked occasionally. The workman should be sure he knows what is wanted, that the job stays "put," and that the tools do not become too dull. When both parts are properly done, spoilage will be small and things will go smoothly.

—L. F. SWENSEN, *Industrial Engineer, Perkins Machine & Gear Co.*

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Eating During Working Hours

NO FAIR minded employer would deprive his employees of the privilege of eating a bite of lunch during working hours, unless he feels that he is being imposed upon. This privilege, like any other granted employees, is often abused, with the result that eating during working hours is forbidden. Such rules are observed for a time, but are soon forgotten, as they are neither fair nor practical. It is an easy matter to post a notice forbidding eating during working hours, but enforcing such a rule is another thing. Certain employees will abuse all privileges, but why impose hardships on the entire personnel because of the minority?

How far the minority is permitted to carry on is merely a matter of supervision. Allow the employees to eat their lunch and most of them will do so while their machine is in operation. Forbid them to eat, and they will lose time eating on the sly. The best policy is, therefore, to discipline those who abuse the rules, rather than to penalize the entire personnel.

—W. J. OWENS, *Foreman, Newport Rolling Mill Company.*

IS IT better to be blind than unjust? The only answer I can conceive is that there is no need to be either. Ed does not have to be blind to his men eating during working hours, neither need he be unjust and absolutely forbid it. There are many good schemes, but the one that strikes me as being the best, is the one used by the Saco-Lowell Textile Machinery Company. Every morning and afternoon a man with a truck containing candy, milk, cake, and sandwiches goes through each department. The men buy what they want and eat it at their work. The time loss is approximately three-quarters of a minute per man each morning and afternoon. Surely, this is a small loss, and I know that it keeps the men in a much better frame of mind.

—CHARLES R. WHITEHOUSE, *Chief Time Study, The Holtzer-Cabot Electric Co*

THE · NEXT · TOPIC

"The Shop Salesman"

Eating During Working Hours

SUMMARY OF THE DISCUSSION

Ed found that some of his men ate their lunch during working hours so that they could start their card game earlier. He threatened to "fire" any man he caught eating his lunch before the whistle blew, but found out later that he was in the habit of doing the same thing himself, by eating an apple. Faced with the necessity of "backing down," he sought his friend Al for advice. Al told him to "get after" the card players but not to try to enforce the rule rigidly.

IT WAS stated that a foreman should never make a rule with a threat attached to it. Neither should he make a rule and give the impression that he himself is an exception to it. The worst possible way to enforce a rule is to permit infractions under the guise of exceptions.

The wording of a rule determines its scope, and if there are to be exceptions to the rule they should be as clearly stated as the rule itself. If the rule reads, "No eating during working hours," every violation of that rule is an infraction of it regardless of the position of the party who eats during those hours. Should the rule read, "No eating during working hours except at . . . . o'clock, when a sandwich, an apple or its equivalent may be eaten," the exception is clearly stated, yet the rule is broad enough to cover the prohibition against emptying the lunch box before the dinner hour. The foreman who shuts his eyes to the eating of a "small portion" of lunch has no way of determining whether it is the first portion or the last.

The opinion was advanced that, in respect to eating, all shops have one thing in common: that is, regardless of rules, men do eat. This being so, it were better to provide confections, or even to have a lunch wagon furnish sandwiches, candy, and milk than to have too strict a rule against eating during hours.

Inspection and Repair of Tactographs

The efficiency of the movement of a railroad train over its division is regulated to a standard found best by practice. The tactograph shows how nearly the standard is being followed

Fig. 1—View of the conditioning department, where Tactographs are repaired and tested

Fig. 2—A view of the Tactograph without its carrying case. Inspection is mainly preventive

By CHESTER B. LORD
Associate Editor, American Machinist

WITH mechanization, industry loses some romance, and little by little the alibis for unsatisfactory performance are being eliminated by scientific methods of visualizing results. The latest to lose a certain glamour and to be mechanized in respect to performance is the railroad. Adherence to a time table is no longer dependent upon the good will or judgment of the conductor and engineer. The percentage of failures to make time is now a matter of public information on the part of most railroads, and when a train is late, be it passenger or freight, the operating department demands to know why it was late and where the delay occurred. Was it the fault of the time allowance, of the roadbed, or of the rolling stock? Was the proper average speed maintained throughout? Or did the engine driver exceed a safe speed on certain sections of the road in an attempt to make up lost time? And did he take the curves at the prescribed speed?

The tell-tale in this instance is the tactograph, a recording instrument that is installed in the cab of the engine, in plain view of both engineer and fireman. The tactograph is geared directly to the driving wheel axle somewhat as is the speedometer of an automobile. Like the speedometer it shows the rate of speed and the total number of miles run, but in periods of half hours instead of continuously. In addition it has a time-actuated record sheet that shows the speed at any time, the stops and their duration, and, by the spasmodic vibrations of the recording pen, the slippage of wheels caused by too much throttle in starting as well as the sliding of wheels in stopping. The record sheet is turned in at the end of each run, and the reason for any delay is deduced from it.

Recording instruments of such delicacy need frequent adjustment and calibration; likewise, the gear that meshes into the primary gear on the driving wheel axle must be changed every time the tires are trued up. The Southern Pacific lines found that this repair work was so unlike any other repair work that it set up a separate department for the care of these recorders.

A general view of this department is shown in Fig. 1. It includes a drill press, a milling machine for cutting gears, an arbor press, a filing machine, and a variable-speed driving mechanism for testing purposes.

While sensitive, the tactograph is not fragile. It is

enclosed in a substantial carrying case and withstands the shock of the service required of it. A view of the instrument with the case removed is shown in Fig. 2. The mile-hour rate of speed, up to 90 miles an hour, is shown on the semicircular scale at the top, and is recorded on the chart tape below as the clock mechanism feeds the tape from left to right. The chart is removed and turned in at each terminal where it is compared to a standard performance chart. This gives a record of the efficiency of the run. The total number of miles

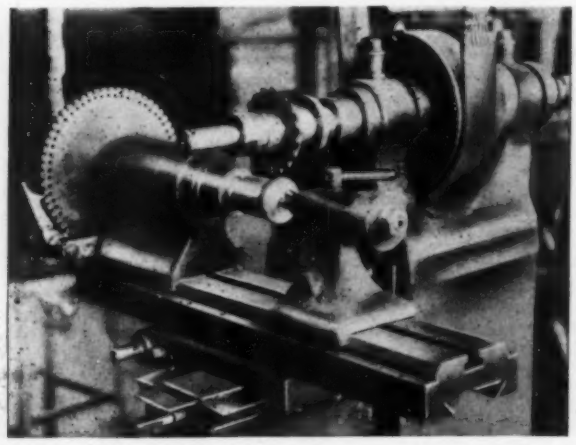


Fig. 3—Cutting gears and ratchets on a hand miller, using an index plate

run each hour is shown on the dial within the semicircle.

A considerable part of the necessary repair work consits in renewing the fiber gears that mesh with the master gear on the driving wheel axle. For a given type of engine these gears vary by only one or two teeth, therefore, an expensive gear cutter is not necessary. A hand miller with a headstock and tailstock, and an indexing plate for each different number of teeth takes care of the requirements. Not an elaborate layout, perhaps,

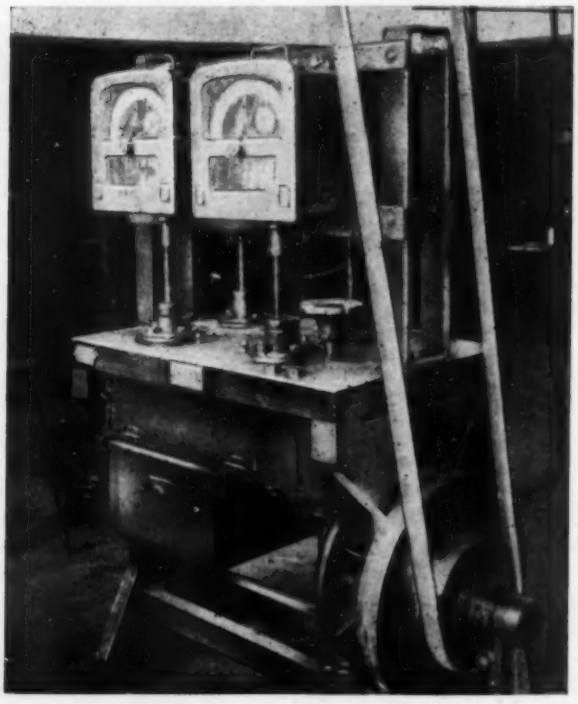


Fig. 4—Speed testing device for calibrating Tactographs

but effective for the work demanded from it. As shown in Fig. 3, the machine is cutting a ratchet wheel which is inserted in the gear train so that the tactograph will register only when the locomotive is going ahead.

A close up of the speed test table is shown in Fig. 4. By means of the two belt pulleys shown, and a small wheel moving across the face of a friction disk, speeds corresponding to an engine speed of from one to 70 miles an hour may be obtained. Each tactograph is run for a period of two hours at varying speeds.

The improvement that has taken place in train despatching is another example of the ease with which a given condition can be improved by visualizing the condition, setting up a standard and measuring the results.

Tight Welded Joints in Commercial Copper

BRONZE-WELDING has proved very satisfactory when ordinary commercial grades of copper are to be welded. The technique for bronze-welding copper is similar to that for bronze-welding steel or cast iron. The parts to be joined are placed next to each other, preferably in a jig, and heated to a dull red heat, the temperature at which the bronze flows most satisfactorily. A high-strength bronze welding rod with a relatively low melting point should be used, so that as little heat as necessary will have to be applied to the copper. A tinning layer of bronze should first be flowed onto the

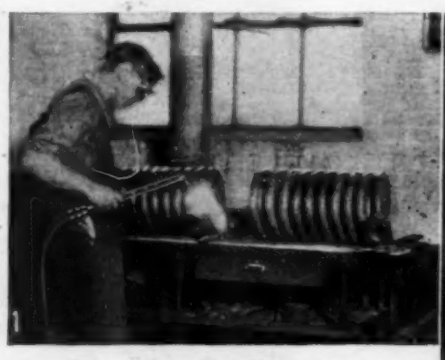


Fig. 1—Bronze-welding flanges on copper coils

Fig. 2—Bronze-welded coils inserted in heater

Condensed from "Oxy-Acetylene Tips" for February, 1930

hot copper, and the use of a good bronze-welding flux is recommended. A neutral flame is used.

In Fig. 1 is illustrated the bronze-welding of the end flanges to a copper coil for an indirect water heater. The coils, assembled in the heater proper, are shown in Fig. 2. The copper coils are housed within the heater pipe through which hot water from a hot-water domestic boiler flows. Hot water enters through the large orifice in the front of the heater, passing out through the two side openings to the house radiators. Cooled water returns through the heater bottom. The piping system is described because, in making actual installations, the manufacturer welds all these connections. It is a typical example of the extension of the use of welded joints.

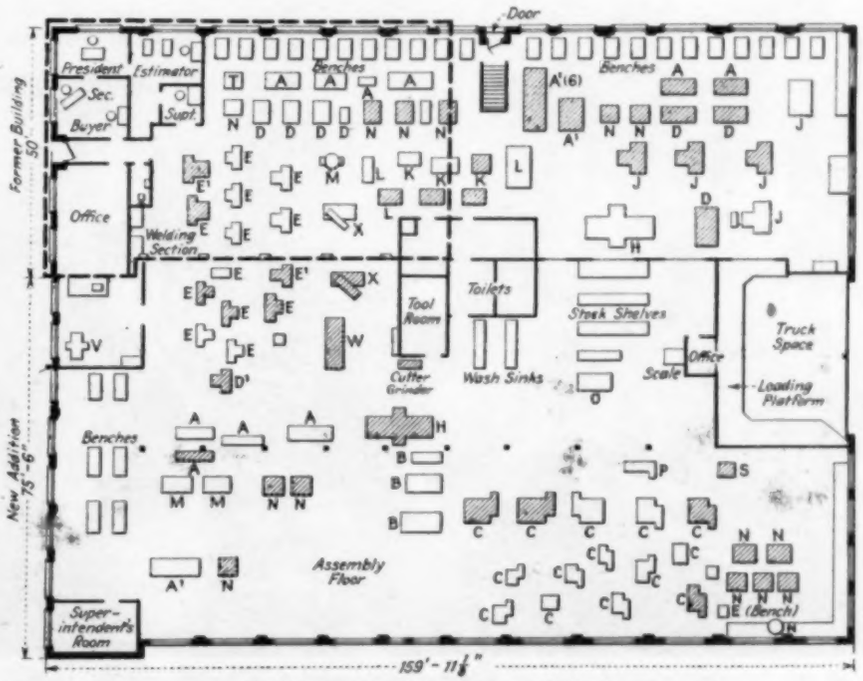
Further Evolution of a Job Shop

By Frank J. Oliver, Jr.
Western Editor, American Machinist

SEVERAL basic policies have accounted for the rapid growth of a certain job shop in the Middle West whose annual sales increased from $27,000 to $750,000 in ten years. Leaving aside considerations implied by that time-honored word "service," the chief factors responsible for this evolution have been quality and price, the latter because of low overhead. Another factor is the broad policy of accepting the responsibility for errors. Even though apparently the customer is at fault, the monetary loss involved is more than offset by future orders obtained on the strength of the good will built up and maintained. High quality of work is attained by the use of modern equipment, skilled workmen, and proper direction. Furthermore, because the shop is up-to-date with plenty of light and air, the machinery new and of leading makes, it has not been difficult to attract and hold good mechanics.

Starting out with a capitalization of $5,000 and a floor space of 800 sq.ft., the Quality Hardware & Machine Corporation, of Chicago, has grown until today it occupies 20,000 sq.ft. of floor space and has over $300,000 invested in the business. Each time an expansion was made, new equipment was bought so that there are now 80 machine tools in the shop, 25 being purchased in the past year. Two years ago the management of the shop was described on page 17, Vol. 66, of the *American Machinist*. There were then 35 men employed; today there are 150. The firm is described again because it is a typical example of the growth of a jobbing business along progressive lines. It is also typical of similar

A—Engine lathe
A'—Bench lathe
B—Turret lathe
C—Punch press
D—Shaper
D'—Vert. shaper
E—Miller
E'—Vert. miller
H—Planer
J—Die sinker
K—Cyl. grinder
L—Surface grinder
M—Drill press
N—Sensitive drill
O—Bandsaw
P—Shears
S—Spot welder
T—Filer
V—Jig borer
W—Horiz. borer
X—Radial drill



Shaded areas represent new machines

Fig. 1—Floor plan of the expanded shop. The original shop, shown by the heavy dash lines in the upper left corner, had one-fifth the floor space. The shop is of brick and wood construction, with hardwood floors, and is well lighted. Unit heaters make the plant comfortable in winter. The black areas indicate where new equipment has been installed during the year just closed

expansions of other Midwestern firms in the past few years, and as such represents a definite trend in management of these shops, which are rapidly assuming a position of real importance in the metal-working industry.

The company began as a retail hardware store, and in 1919 took space next door for a machine shop. Two years later, a modern plant was erected on the present location, but only half of the available floor space, 8,000 sq.ft., was used, the remainder being rented out for a garage. This space was absorbed later as the business grew and in mid-1929, 12,000 more square feet of floor space were added. At the same time additional land was purchased for possible future expansion.

In the early days, the company started out to make punch press dies, and this still constitutes a large part of the business. From this developed a drop forge die department, which has been segregated from the rest of the shop. In this department are five vertical die sinkers, a heavy-duty shaper, and a planer which is used only for this class of work. Lead casts are made from the completed dies and sent to the customer for check.

Punch press dies, however, are tested by actual use in a press before leaving the shop. A few punch presses were bought for this purpose, and then an attempt was made to get manufacturing work to keep these machines employed at other times. The idea was to absorb the overload of press departments of some of the larger local plants, and it worked out so well that there are now fifteen presses in the department. Four new ones were added when the present expansion was made.

In line with its policy of complete service to customers, the company has built up a special machinery department. Since most manufacturing concerns find that the construction of special equipment interferes too much with production to make it profitable to build such machines in their own shop, they are quite willing to give out work of this type. A part of the shop has been set aside for this work, and a special designing engineer added to the staff to supervise it. Usually the customer furnishes the specifications of the work the machine is to do and has the details of construction worked out by the job shop. This type of work is always done on a cost plus basis.

Incidentally, this special machinery department serves as an outlet for older machine tools that are still serviceable for this class of work, but are not suitable for accurate tool and die work. For this particular company, this solves the problem of what to do with an old machine when a new piece of equipment is bought.

A department that serves both the special machinery and the general manufacturing divisions is the drill press and assembly department. Similarly, since the milling department serves the tool and die department and the general manufacturing section as well, it is difficult to draw departmental distinction at this point. The tool department has been completely modernized. Individual benches with cast-iron frames and wooden tops have been substituted for what was formerly a long bench against the north wall, and some new pieces of equipment have been added including two toolroom lathes, two shapers, six bench lathes, and several sensitive drills with large, square tables. The individual bench plan fits in well with the idea of letting each tool maker follow through his own work from start to finish, with the exception of grinding operations. There are now seven grinders in the tool department, and they are all operated by specialists in this work.

As the company expanded, it found use for equipment not ordinarily seen in a job shop. Recently the second radial drill was installed for use in the manufacturing department. In the same section were added a vertical shaper, a horizontal boring machine, two milling machines, and an openside planer, all obtained from leading makers. In a separate, dust-proof room, operated by a special workman, is a precision jig borer, another recent addition. In the same room is kept surface plates for use of the inspection department. A spot welder was purchased for use in the punch press department in assembling stamped metal parts.

Individual electric motor drive is favored on all new machines purchased. Belt drive is used in the older parts of the shop, but has been modernized to the extent of using ball bearing hangers for the lineshafts. These machines, however, will be replaced in the near future by individual motor drive machines.

When the shop was small, each man went to the stock

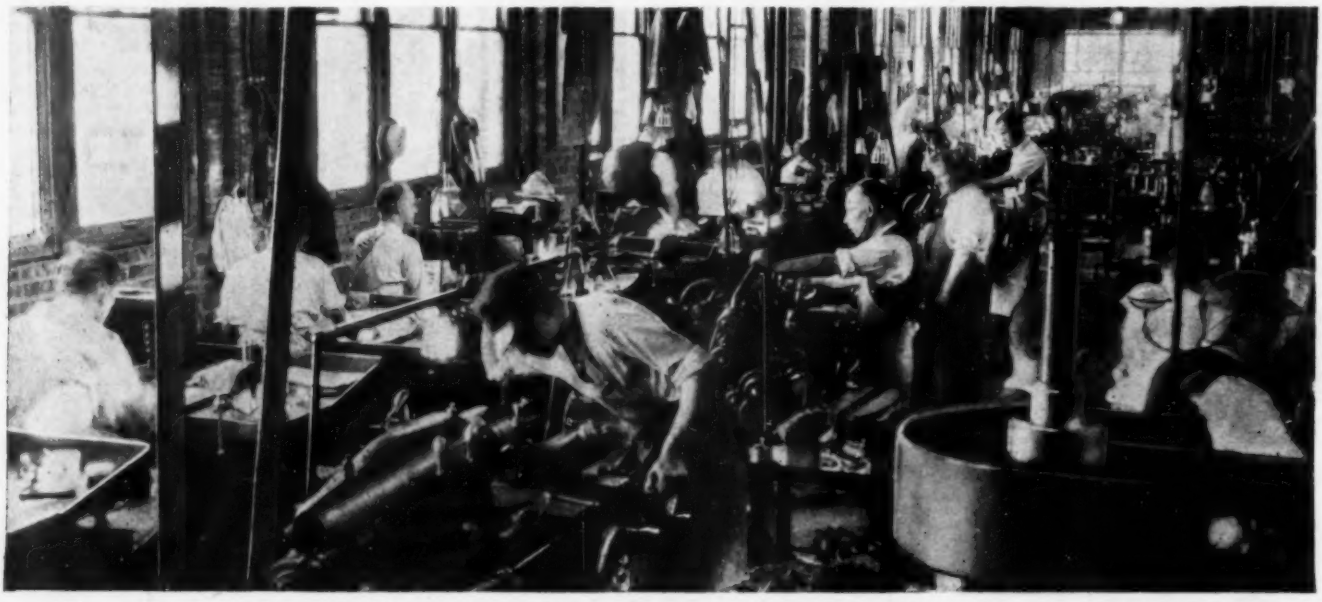


Fig. 2—A number of new machines made by leading manufacturers, have been installed in the toolroom. In this view can be seen the separate toolmakers' benches. In all 31 machine tools have been purchased in the past year

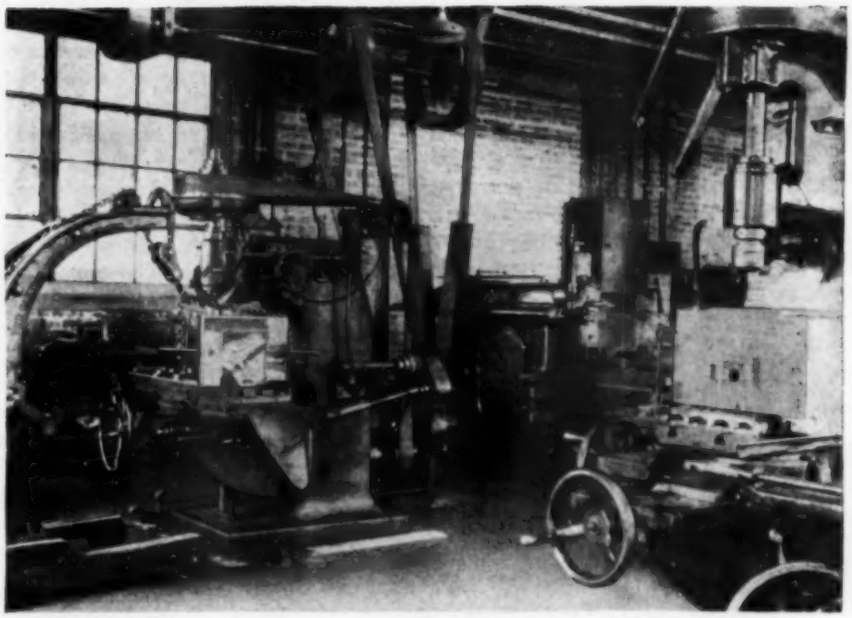


Fig. 3—A corner of the drop forge die department. A planer, heavy-duty shaper, and three die sinkers are found in this section, most of the equipment being new. Heavy die blocks are handled by means of the portable crane shown.

rack for his material and cut it to length. Now a man in charge of the cut-off machine does this work under direction of the production manager who is in charge of all materials. Similarly, where previously each man procured his own tools from an open crib, a toolroom attendant is now provided and issues tools against brass checks. The attendant also keeps the tools in condition although major repairs go through the shop as a regular outside job. Punch press die sets, however, are not kept in the tool cribs, but are stored in steel shelves alongside the machines to save transportation.

To avoid the confusion that would occur when a tool-maker, for example, wanted to use a machine that was engaged on a production job, the various departments are separate. Experience in this direction has shown that considerable time is saved by handling each class of work separately. Occasionally, however, men are transferred from one department to another so as to maintain a uniform force when work in certain departments becomes slack.

When an order is placed for a tool or a die, the original estimated figures, including the material to be used and the subdivided operations such as layout machining, bench, and assembly work, are listed on a cost sheet, which is filed by number. Then, as the work progresses, the actual time consumed for each operation is recorded on the same sheet. These records offer a comparison at all times, inasmuch as the figures are recorded daily. If a job is falling behind the original estimate, an immediate investigation is made to determine the profit or loss, as the case may be, by examining the comparative figures. The time records of each job are entered on the cost sheet by a time keeper who also attends to the payroll and miscellaneous office duties.

In handling production work, the parts are run through in quantity lots, so that the set-up time is reduced, and a lower cost per piece is established. The nature of the product generally controls the method of manufacture, but the general practice is to make a number of parts first and to assemble them later. Jigs and fixtures are designed in accordance with the amount of production required. Castings and forgings are purchased from outside concerns.

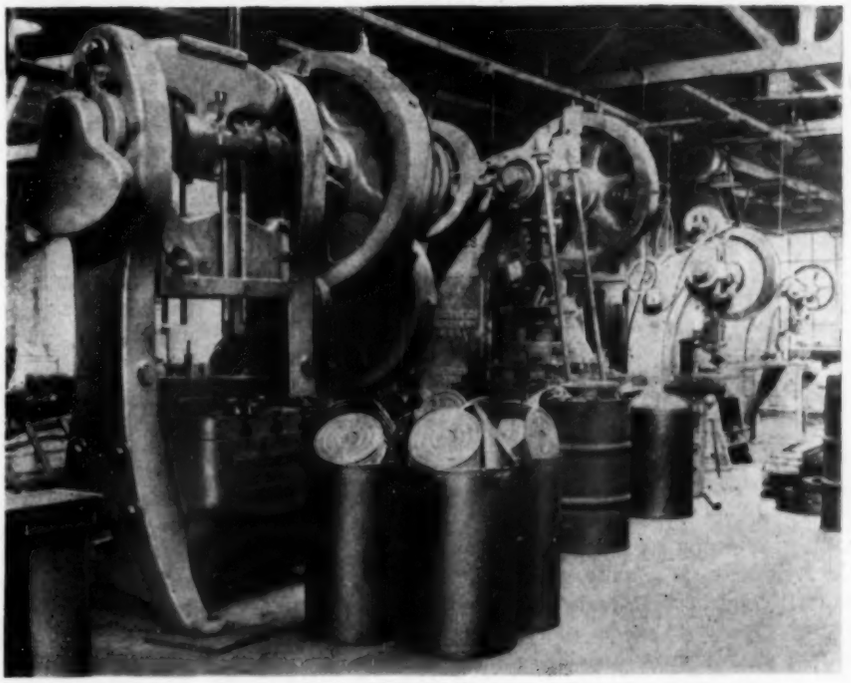


Fig. 4—Four new presses have been added to the punch press department, which began by the purchase of a few machines for testing die sets in operation. Now the company does enough work of this class to keep fifteen machines busy handling the overflow of several large manufacturers

As the plant has expanded it has been necessary also to expand the personnel, and, where before several functions were placed on the shoulders of one man, separate men now handle these duties. The president of the company acts as contact man and brings in most of the business. The secretary and treasurer buys all materials and supplies, approves credits and supervises the office force. A general superintendent supervises the entire shop. During the past year a mechanical engineer who acts also as estimator, has been added to the staff. Being responsible for the supervision of tool designs and for all quotations, he reports directly to the president. The responsibility of having raw materials on hand for all work in process rests with a production man, who also keeps check to see that work is completed on the prom-

ised date. Formerly the general superintendent did the estimating and tool design, ordered the materials, distributed the work, and generally supervised the progress of each job.

The office staff consists of four girls and a man. The man assists in the buying of raw materials and supplies and does all of the payroll and cost work.

The general superintendent, each of the five foremen, and each mechanic who has been employed five years or more have purchased stock of the corporation under a partial payment plan. Every stockholder is naturally a satisfied workman and as such gives the company, and indirectly the customer, the benefit of having his work done economically and satisfactorily.

Enough has been said to indicate why the morale of the shop is good. Toolmakers are influenced by a well-lighted shop in which modern equipment is installed and by the steadiness of the work. Little driving has been found necessary. The men are interested in their work and will work overtime and on Sundays in order to complete a job on time. Customers have access to the shop at any time, and the personal contact developed with the men has resulted in a better feeling all around. Engineers and production men from these leading customers are frequent visitors to the plant. The company does not advertise and has only one solicitor out other than its president; hence it must rely largely upon the good word of customers and its reputation to bring in new business.

To sum up, no one factor was responsible for the success of this job shop: there were many factors, all interrelated. For example, the use of modern equipment was reflected in several directions; it increased the confidence of the customer, gave him more accurate work at lower cost, and boosted the morale of the workmen. It enabled the company to attract good men and to hold them. Because business, in a way, has come in of its own accord and the necessity for an extensive sales force has been eliminated, overhead expenses are low. This has resulted in a low unit cost, which has in turn attracted re-orders and new business.

Underlying Principles of Soft Soldering—*Discussion*

By A. Eyles

HAVING READ with much interest the article by Mr. P. C. Ripley under the above title on page 365 in Vol. 71, No. 9 of *American Machinist*, and having served over forty years as apprentice, mechanic, and foreman in jointing commercial metals by soft soldering methods, I should like to add a few remarks regarding soft solders and soldering.

Mr. Ripley's statement, "Mechanical strength of a soldered joint depends more upon workmanship than upon the solder itself," is not always correct, although I agree that many mechanics perform soldering operations with poorly designed tools, or employ incorrect methods. In the writer's opinion, the mechanical strength of soft soldered joints is usually dependent upon the nature of the solder used, the depth of penetration of the solder, the temperature at which the soldering is carried out, the cleanliness of the surfaces to be joined, the proper use of correctly designed soldering coppers, the proper use of correct fluxes, and the speed of soldering.

The question is frequently asked, "What is the strongest soft solder that can be made?" Numerous experiments have been made during recent years, but the results are rather confusing. Tests of tensile strength based upon cast bars, sticks, and wires indicate that the higher the tin, up to 73 per cent tin and 27 per cent lead, the greater the breaking strength. In the case of two pieces of tinned sheet steel soldered together, the maximum strength is obtained with a solder containing about 60 per cent tin. Experience has shown the writer that the strongest mixture for general soldering purposes is a solder composed of 57 per cent tin and 43 per cent lead, particularly if ¼ to ½ per cent of antimony is added. For mechanical soldering, 45 per cent should be the highest tin content, and for most dipping bath work, it has been demonstrated that tin from 35 to 45 per cent, according to the nature of the work, will give ample satisfaction provided the solder is properly made. Modern rosin- and paste-cored soldering wire is especially suitable for all radio and electrical soldering jobs.

In most soldering operations, the solder flows with the point of the soldering copper. This can be greatly facilitated by suitably tilting the product to be soldered in the same direction as that in which the soldering tool is traveling. In other words, all soft soldering should be downhill and not uphill. The difference between the two methods is generally the difference between failure and success. The chief difficulty which many operators encounter in soft soldering operations is entirely due to misguided effort to solder in an uphill direction. Thus the solder refuses to follow the soldering copper, and as a result, usually cools down in unsightly globules or moss on the work. The remedy is obvious, as a slight tilt of the work is often all that is required to turn failure into success. In conclusion, it may be safely stated that soldering is not a gift; a man cannot be a born solderer, nor can he be born with a soldering copper in his mouth in place of the proverbial silver spoon. He must learn by actual experience how to do a practical soldering job. I strongly indorse Mr. Ripley's suggestion that instruction should be given in the technique of soldering just as is done for welding.

In the recent construction of a 250-mile gas line, using pipe 20 in. in diameter, each one-mile section was tested before being lowered into the trench by closing the ends of the section with a welded "orange-peel" bull plug and filling the section with air at 100 lb. per sq.in. pressure. Then each weld was painted with soapy water, and a recording pressure gage was attached to the line. The section was required to maintain a 100-lb. pressure for 24 hours. Air released from one section was used to build up pressure in the next.

Stop Gaps for Leaky Payrolls

Many industrial plants are paying for a pension system without enjoying its benefits. Too often, the line of least resistance is followed; old employees are neither discarded nor specifically provided for. Inefficient operation and "hidden pension" cost are frequent results

THE superannuated employee is now holding the center of the industrial stage. Around him has evolved what is proving to be a costly situation. This is largely because of industry's short-sightedness and slowness to realize that the older employee was surely developing into a major problem—one that could not be met by makeshifts. Some concerns have sought a solution of the old age problem by keeping old employees in positions of trust or skill, after they had passed the point of their greatest efficiency. In doing this, they have become involved in what amounts to "hidden pension" commitments. Apparently, they have been unwilling to install sound and scientific pension plans, on a formal contractual basis, which would automatically solve the old age problem by providing retirement incomes for superannuated employees. Instead, they have made recourse to the costly "hidden pension" plan, a term which aptly describes the make-shift of giving continued employment to the worker after his best days have passed. This is an expedient which not only creates a big leak in the payroll, but in many instances, causes discontent and lowers morale among the personnel.

While several hundred business and industrial organizations in the United States already have formal pension plans in operation, there are many others which are caring for old employees in an informal way. Practically all are giving their best thought to methods of assisting veteran workers, and whatever may have been the policy years ago, most economists agree that few, if any old employees now are being dismissed, because of reduced efficiency without some financial provision. Those concerns, which have adopted funded pension plans, have solved the old age problem, by establishing a system which provides the worker who reaches a retirement age, of say 65, with a pension that keeps the wolf from the door, even if it doesn't furnish him with all the luxuries. But those organizations which have begged the question of pensions, declining to meet it squarely, are not only indulging in a luxurious substitute for a sound retirement plan, and an expensive one at that, but are failing the very persons they are trying to help. They are giving old employees money, they are not really earning, instead of providing for their old age by means of a plan which permits the workers to retire without losing their self-respect.

There is an old saying that you can't eat your cake and have it. Translated into economic terms, this also applies to industry in general, which, in most instances, can not retain old employees at full pay without starting a leak in the payroll. To a lesser degree, the same thing holds good, if the old employee is transferred to a position of less responsibility or skill, at a lower wage. The payroll suffers, because, more likely than not, he will be paid a little more than a younger man would. He may even be transferred to a less important position, and be paid the salary that went with his former job. However one looks at it, this head-in-the-sand attempt to meet the pension problem, works to the detriment of the payroll, and to business in general. First, the veteran employee is being paid perhaps more than his capabilities warrant; second, his retention (in his old job) is apt to slow down the work in his department; third, discontent among other employees is apt to follow, when those below see in him a bar to advancement.

While actual figures and statistics respecting this phase of the old age problem of industry are rather meager, some important and interesting information has come from reliable sources. Although this information is based principally on the experience of larger organizations, it is unquestionably true that the facts and conditions indicated apply with even greater force to the smaller shops where friendship and personality count.

Noel Sargent, manager of the industrial relations de-

partment of the National Association of Manufacturers, in a supplement to "Industrial Care of the Long Service Worker," published last fall, quotes E. S. Cowdrick, counsellor in personnel administration as follows:

"A pension plan, if wisely drawn up and prudently administered, may be an actual economy rather than an expense. In every industry that is more than a few years old, there are aged employees with long terms of service to their credit. At least some of these employees have become liabilities rather than assets. As human machinery, they have depreciated to a point where their continued employment is unprofitable at best.

"If we admit that we are not going to scrap the aged employee, we find ourselves still facing the question: What are we going to do with him? The easy thing is to keep him on the payroll, drawing his full wages every week, for doing whatever we find for him to do. This is precisely what is being done by many employers, who delude themselves with the thought that they have no pension expense. As a matter of fact, it is quite conceivable that these employers are expending in an overloaded payroll, in increased accident hazards, and in the blocking of promotion for younger men, far more than they would pay to retired employees under moderate pension plans.

"As an alternative to the retention of aged employees upon the active payroll, we find the industrial pension, under which they are retired, with allowances which are graded according to their length of service and their past earnings, and which are estimated to be at least sufficient for the bare necessities of life.

Pension Less Expensive

"In the opinion of many students of the subject, the pension is the less expensive of the two alternatives, provided that it is not unduly liberal, and that it is administered prudently and with due regard to the interests both of the employee and the employer who pays the bills. Thus administered, a pension serves to relieve the payroll of aged employees who have become liabilities to the business, but to do it in a manner that involves neither undue hardship to the employee nor outrage to the sensibilities of the community. It is in this function that the industrial pension finds its most reasonable motive and its strongest justification."

In the Atlantic Monthly, of September, 1929, M. B. Folsom, writing on "Old Age On the Balance Sheet," says: "Without provision for the retirement of employees, an employer confronted with the discharge of an employee who has given long service and who does not have sufficient means for sustenance, does not discharge the employee, but keeps him on the force. As a result, there is a pension cost which is not recognized as such."

J. E. Kavanagh, Second Vice-President of the Metropolitan Life Insurance Company, and Ingalls Kimball, Director of Group Annuities, of the same organization, have both pointed out some specific instances of the leaky payroll.

At a meeting of the Chamber of Commerce of the United States, Mr. Kavanagh told how failure to establish a sound pension program had adversely affected the payroll and business of a bank. Quoting the banker, Mr. Kavanagh said: "We haven't any pension plan, but we are paying one retired officer twenty thousand dollars a year and another one, nine thousand. Both fine men. Both men devoted to this bank. Both men who had been so busy for us that they had no time or inclination for outside investment. Both men whose positions required expensive establishments. Both on the other hand, men whose judgment was based on the business and economic experience of ten years ago. Those two retirements cost us $29,000 last year. They would have saved us two hundred thousand that I know of if they had happened a year sooner."

A Little Too Long

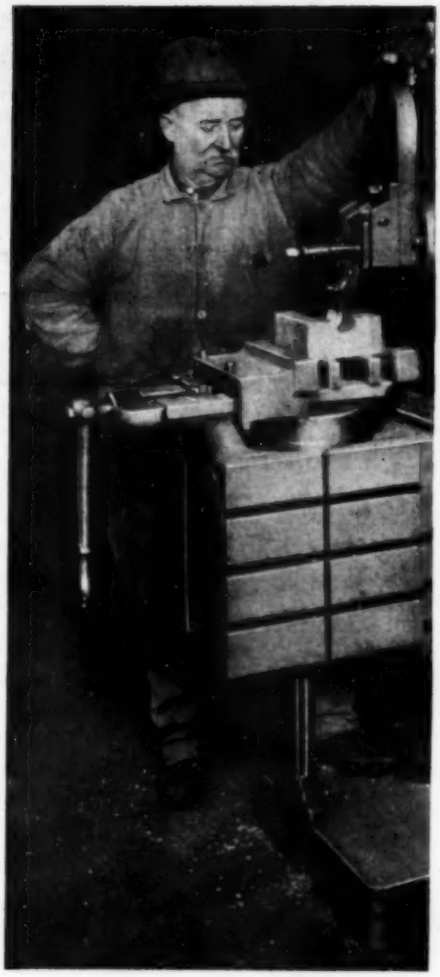
Perhaps just an error in judgment; another case of the older man out of step with the times, not quite up to the responsibilities of present-day competition, without the financial means of retiring, and employed by a concern which had not made it possible for the old employees to retire in comfort before their let-down. Just a case of keeping the older man on the job a little too long.

In a recent issue of the *Journal of Accountancy*, Mr. Kimball points out that an investigation made by the Bethlehem Steel Company "disclosed the fact that out of 300 men retired on pension, only 111 required actual replacement." If the entire 300 had been kept on the payroll, because no arrangements for pensioning them had been made by the company, a good many thousands of dollars obviously would have been added to the payroll. Referring to one of the great railroads, Mr. Kimball says: "One railway reports that, out of 48,000 employees, about three per cent are over 70 years of age. The pay of these 1,400 employees is more than a million and a half dollars a year, and it seems not unreasonable, that the actual work performed by them might be done for less than half of this amount."

How can such conditions, conditions which exist in practically every branch of industry, be corrected to the advantage of both employer and employees? At least one scientific solution of the old age problem in industry is found in a sound pension plan, preferably, perhaps, in a program in which both the employer and employees contribute to the cost. It should be one which absolutely protects the rights of the employees, at least so far as

THE VERY NEXT NUMBER

To commemorate the golden anniversary of the A.S.M.E., the *American Machinist* will publish a special number. This is particularly fitting, because the preliminary meeting of the Founders of the Society was held in the old offices of *American Machinist*, and the delegates to the anniversary celebration are to be guests of the publishers and editors in the present headquarters, on April 5. With golden cover, symbolic of the anniversary, and illustrations in tints of black and golden buff, this number will represent in word and picture fifty years of advance in mechanical engineering and manufacture.



the pensions based on their own deposits are concerned. Pensions, or retirement benefits, established as a result of the employees' own contributions should be fully protected by contract, so that at least that part of the total pension will surely be paid, on the employees' retirement, irrespective of what happens to the concern he works for, which might go out of business or be merged with another company that has no pension program. Such a pension system can be developed and put in operation on a scientific basis. Under such a system, the employees will be assured that their contributions, or deposits, toward the purchase of a pension for their old age will be used solely for that purpose. They will never be used for any other purpose unless an employee himself should exercise his right to withdraw from the pension plan, when all, or a large proportion, of his deposits would be returned to him. Such a program can be installed through contract made with an insurance company, under a plan called group annuities, or by means of a trust.

This, of course, is not the only way in which a sound and scientific pension system can be established. A financially strong business organization can carry its own pension program, and do it successfully, if it is based on actuarial calculations, which are meticulously followed by the company. But, with such a plan, there is always the possibility that the employer will not make adequate provision for future liabilities, despite the best actuarial advice. Nor, in such cases, are the pension rights of the employees protected by actual contract, as they are when a pension program is being administered by a life insurance company, or under a trust.

No matter with what consideration a business or manufacturing concern would like to treat its older employees, it stands to reason that the financial burden involved in carrying superannuated workers on the payroll will eventually become so great that some sort of readjustment will be necessary. Industry has begun to realize that retention of employees after they have hit the down-grade starts a leak in the payroll which is likely to grow into a good sized gap. For this reason, leaders of industrial enterprises, both large and small, are fast subscribing to the belief held by many economists that the only real stop-gap for leaks of this sort is the funded pension plan, which operates with equal justice to employer and employee.

Keeping a Line on Tools—*Discussion*

By J. T. Towlson
London, England

APROPOS of the article by Frank V. Faulhaber, under the title given above, on page 840, Vol. 71, of the *American Machinist*, I believe—in fact it has been my experience—that concerns having sufficient perspicacity to inaugurate a toolroom have had sufficient business acumen to keep full records of their purchases, as well as the successes and the failures of such purchases; thus, I agree with Mr. Faulhaber.

There is one phase, however, of this tool-record question—a rule of sorts—that appears to be much more honored in the breach than in the observance. It is this: Take, for example, a machine shop having a frequently occurring change of hands. Strangers at the lathe, or at vise work, would not know the resources of the toolroom; that is they would have no direct means of knowing what tools the toolroom possessed; and the direct result would be that work would be hindered by time being lost, either in "making shift" without the particular necessary tools for the job in hand, or by applying to the toolroom for such tools as it did not possess. Both such predicaments are greatly to be deprecated, but may be avoided in the following way: Side by side with the record book that Mr. Faulhaber so wisely commends, let another book be kept, a book holding the names of all the tools possessed by the toolroom.

Each man on being employed would be handed one of these books with his tool checks and his book of rules. With this book in his possession, he would never be required to waste time "making shift" when a tool was ready for the asking.

Correlative with the foregoing is the adoption and full use of what may be termed "broken-tool cards," which I have found to be a valuable acquisition and mate to the tool book. These cards contain the name of the tool, the date of breakage, the breaker's name, the stated cause of the breakage, and the foreman's signature. As affecting tool costs, these cards have been found of considerable value, since the toolroom could not accept a broken tool unless it was accompanied by a broken-tool card, so that even the less costly tools could not be broken and returned to the toolroom with impunity. A succession of broken tools from one man would lead to an early and exhaustive investigation.

IDEAS FROM PRACTICAL MEN

The department, "IDEAS FROM PRACTICAL MEN," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from a minimum of five dollars upwards, depending upon their merit.

Hacksaw Blades and Some of Their Uses

By WM. S. ROWELL

BELIEVING that the ancient and honorable hacksaw is not always appreciated at its full worth, the following uses for the blades are herewith submitted:

In Fig. 1 is shown a blade ground narrow so as to enter at close quarters, or to enable it to saw curved slots. An enlarged section of a blade ground very thin at the edge, and slightly concave to provide "set," is shown in Fig. 2. A blade so ground was used to split $\frac{1}{16}$-in. diameter pins, cutting a kerf about 0.020 in. in width. Very little of the blade so ground will suffice for such work. The finest-toothed blade available should be selected for this purpose.

A good way to recondition a blade that has dropped several teeth at one or more places is shown in Fig. 3. When a gap occurs along the line of teeth, instead of using the blade in its crippled condition until the gaps are so wide and so many that it is useless, then going to the toolcrib for another blade, step to the grinder and grind it as at *A–B*. Grinding the blade in this manner provides an inclined edge that lifts it over the gap and effectually prevents more teeth from breaking.

Blades having the finer pitches of teeth are the least subject to tooth breakage, especially in sawing thin materials, tubes, etc., and they cut as well, or better, except in very soft material, than those having teeth of a coarser pitch. Sheet metal can best be sawed when clamped in the vise in company with a board. This combination not only adds stiffness to the thin sheet, but prevents the saw from biting too freely and breaking its teeth.

When a blade is to be used without a frame—because of interference—a quick way to provide a handle is to wrap a short portion of the blade with friction tape. Most blades very soon lose a part of their "set," except near the ends. A very good way to avoid the annoying catch at the end of the stroke is to grind the "set" from about $1\frac{1}{2}$ in. of each end and to use all of the blade at each stroke. The hacksaw blade is a good lathe cut-off tool, especially when the cuts must be narrow to conserve material. It wastes very little material and cuts off the frailest of pieces running between centers without danger of bending the work. The work should be run at filing speed when cutting off in a lathe.

Discarded power-hacksaw blades make the finest of lathe cut-off tools for small work, when used in a holder such as shown in Fig. 4. The holder should be made of tool steel, hardened and drawn to a hard, cold-chisel

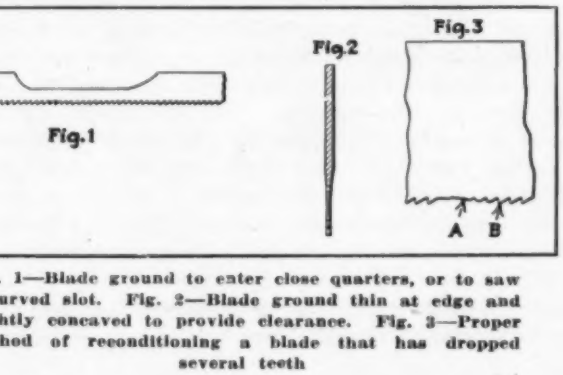


Fig. 1—Blade ground to enter close quarters, or to saw a curved slot. Fig. 2—Blade ground thin at edge and slightly concaved to provide clearance. Fig. 3—Proper method of reconditioning a blade that has dropped several teeth

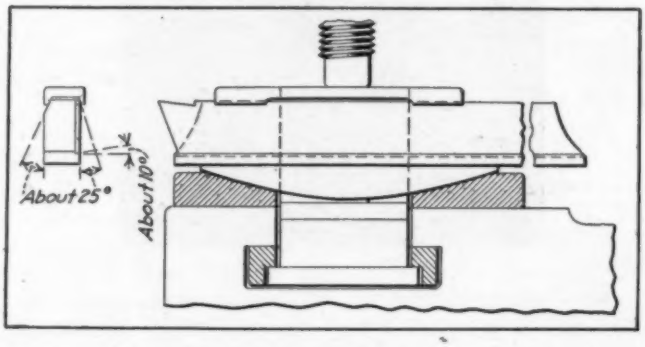


Fig. 4—Holder for using power-hacksaw blades as cutting-off tools

temper. Its dimensions should be adapted to the size of the blades to be used, and to the opening in the toolpost. The clamp should be made of spring steel and should stand above the body of the holder about $\frac{3}{64}$ in. when free. The blades should have their teeth ground off, and ordinarily they need no clearance.

A Flexible Fixture for Welding

By HARRY SHAW

Lancashire, England

When certain forms of frames are being welded together, allowances must be made for the contraction of the plastic metal as it cools. This contraction sometimes causes the frame to be pulled out of square, for which reason the parts are frequently welded together while slightly out of square, so that as the weld cools the parts will be pulled into their correct positions. When the parts are held in position by a fixture, the rigidity of the fixture sometimes prevents the contraction of the metal from pulling the frame out of shape. This condition is detrimental, because the stresses set up in the welded joints tend to weaken the frame, and should the frame

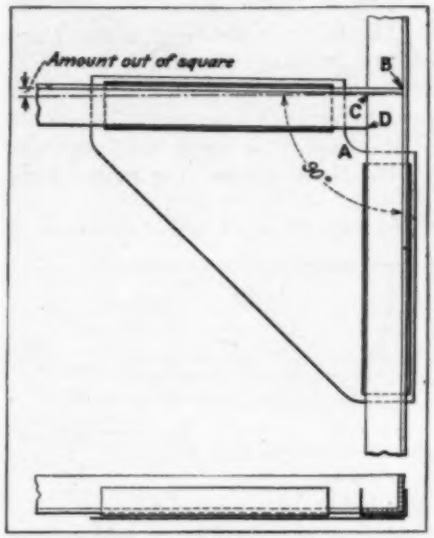


Fig. 1 — Flexible welding fixture in which allowance is made for the movement of the parts as the weld cools

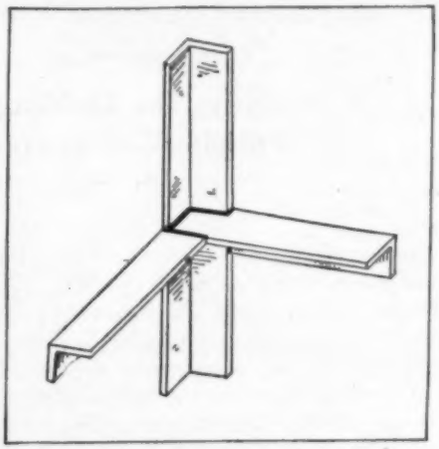


Fig. 2—Position of the welds on the leg of the gas range referred to in the text

be subjected to heat when in use, the stresses induced by the welding will be released and the frame will be distorted. In a certain gas range, the sheet-metal cases in which the refractory tiles were held were fastened to angle-iron frames. These frames were originally welded together while being held in position by hand, but when methods were improved the frames were held in position by a fixture. The first frame welded by the aid of the new fixture was used in an entirely new design of range, which was tested in the works for speed of cooking and for consumption of gas.

Soon after the test had started, the sheet-metal case containing the refractory tiles began to buckle, causing the tiles to break. When the range was dismantled it was found that the legs had drawn in about $\frac{3}{4}$ in. near the floor, owing to the heat used in the test having released the stresses set up during the welding. To obviate this trouble, the fixture shown in Fig. 1 was made. Though very simple, this fixture located the parts of the frame in their proper positions and yet allowed them to move as the weld was cooling.

The fixture consists of a piece of sheet metal of 22 S.W.G., to which are fastened two sheet-metal channels at an angle slightly greater than a right angle. The fixture is placed flat on a bench (preferably iron) with the part *A* slightly off of the edge of the bench. The two pieces to be welded together are placed in the position shown. The joint *B*, farthest away from the fixture, is welded first, for the fixture offers no resistance to the movement of the parts as the weld cools. When the weld at the joint *C-D* (the welding being started at *C* and finished at *D*) has been made and begins to cool, the parts begin to draw in and the thin, sheet-metal base of the fixture buckles to permit their movement. The frame consists of four legs welded to side pieces, as shown in Fig. 2, the thick lines indicating the welds.

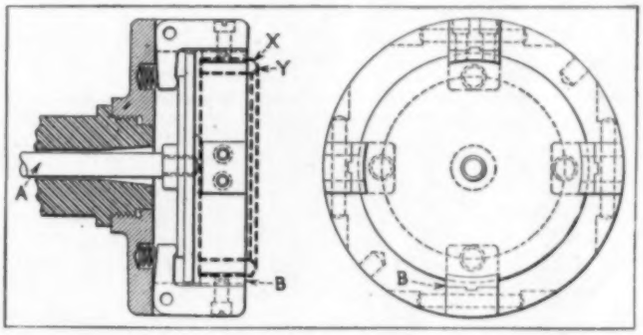
I feel certain that much of the condemnation of welded construction occasionally heard, is because the objector has at some time or other seen work in which the effects of contraction of the welds have not been considered by the welder.

An Air-Operated Chuck

By B. J. Stern

In the illustration is shown an air-operated chuck used for holding bushings, such as the one shown in heavy dotted lines, while the surfaces *X* and *Y* are being chamfered. The chuck is mounted on a small turret lathe equipped with an air cylinder (not shown), to the piston of which the actuating bar *A* is attached. Screwed to the chuck end of this bar is a hardened plate, which in its normal position is held against the false jaws by springs behind the four bell cranks.

The work is placed in the false jaws *B*, in which it fits closely, and the air is turned on, drawing back the hardened plate and actuating the bell cranks, the upper ends of which are held against it by springs. The bell cranks, pivoting about pins in the body of the chuck, force the false jaws inwardly against the work, holding



Chuck operated by air pressure

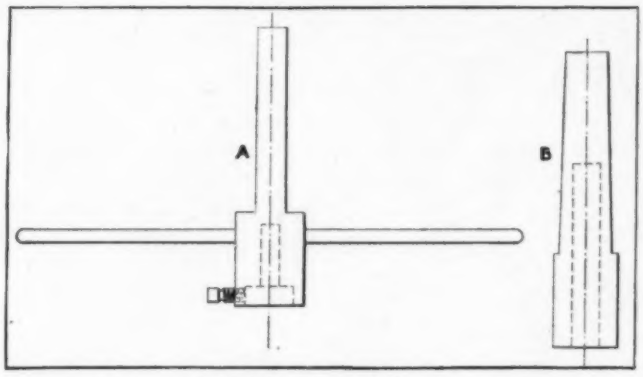
it tightly in place. Upon completion of the chamfering operation, the direction of the air is reversed, forcing the hardened plate outwardly and allowing the springs to operate the bell cranks to release the work.

Threading Small Screws

By O. A. Wagner

In threading small screws, like gun screws and other machine screws, much trouble is encountered and time wasted when the usual method of employing the lead-screw and threading tool is used. It takes considerable time and care to produce a proper fit, and the tool often catches and bends the slender work. The accompanying drawing shows a device with which I have overcome this trouble. Part *A* is a die holder for button dies. This holder has a central projecting rod to guide the die, a handle to turn it and a setscrew to hold die. Part *B* has a taper shank to fit lathe tailstock spindle and a centrally located hole to receive guide rod on part *A*.

In use, the screw stock is chucked and turned down in the usual way, the tailstock with die holder inserted is moved up and the die is run on and off by hand. This



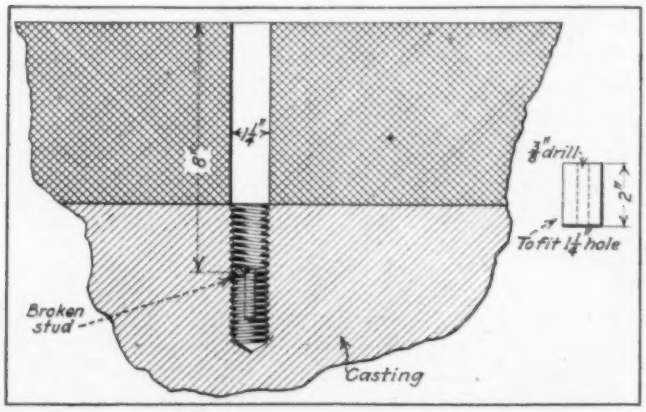
Die holder for tailstock

results in a proper fit and a true thread in much less time and with more certainty than by the usual method. This stunt is of course for the repair shop, where but few screws are made, and those in great variety as to length, thread, style, and size of head.

Removing Broken Studs

By Richard H. Kiddle

The accompanying sketch shows our way of removing broken studs. The studs in question were of 1¼ in. diameter and broke off 8 in. below surface of the castings. We had only a small ½-in. electric drill, so we made a bushing to fit hole as shown by the sketch. Dropping



A bushing is used to center the drill

this bushing into the hole enabled us to start a ⅜-in. drill in the center, as the bushing would center the hole in spite of the unevenness of the break.

After drilling the broken stud, we drove in an easy-out and screwed out the stud. The broken studs were not very tight owing to the vibration of the machine.

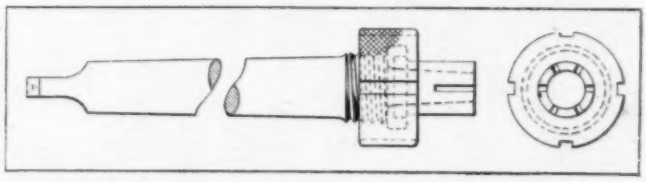
An Expansion Arbor

By O. C. Parham

The expansion arbor shown in the illustration was made for holding saws and narrow milling cutters. It has proved to be very useful for both tool and production work.

The body of the arbor is made of machine steel, carburized, hardened and ground. It is tapered at both ends and is threaded for a nut. The taper at the left is made to fit the spindle of the machine in which the arbor is to be used. The taper at the right is short and is fitted with a tool-steel bushing, hardened, drawn to spring temper and ground. The bushing is slit in three directions at each end to provide for expansion as the nut is tightened. The nut is tool steel, hardened, and ground on the face that bears against the head of the bushing.

Tightening the nut draws the bushing on the taper at



Expansion arbor for saws or narrow cutters

the front, expanding it in the hole of the cutter, or saw. The grip is tight enough to prevent the cutter, or saw, from slipping under the pressure of the cut.

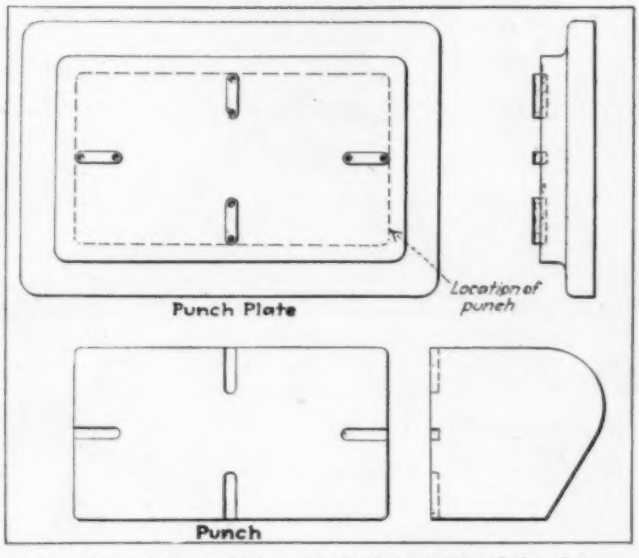
Cross-Keys for Holding Heavy Punches—*Discussion*

By F. C. Twist

De Forest Radio Corporation, Ltd., Toronto, Canada

Referring to the article by Ernest Foldvary, under the title given above, on page 194, Vol. 72, of the *American Machinist*, I consider the following method of placing the keys more satisfactory than the method described by Mr. Foldvary, having used it with success: four separate keys are located close to the outer edges of the punch, as shown in the illustration. This construction is more rigid than one having the keys in the center.

The keyways are milled in the punch so that they are open at the outside, though they can extend all the way across if desired. The punch is then laid on the punch plate in the correct position and the positions of the keyways are scribed on the plate, after which they are cut. This method permits faster assembly of the punch and the plate, inasmuch as all the keys are in sight, which is not the case when they are in the center.



Location of keys and keyways in the punch and the plate

Typical Standard Die Sets

STANDARDIZATION of die sets is a relatively new practice, but one that has not been lost sight of by farsighted, analytical manufacturers. The result has been a reduction in the types of sets available and the development of new types of sets only where conditions warrant.

Another advance has been the change in the materials from which die sets are made. Originally cast from gray iron, sets are now cast from semi-steel mixtures, one manufacturer going so far as to add chrome and nickel. This mixture, though more expensive, is much stronger, reduces blowholes and shrinkage dangers, and consequently, makes up for the slight increase in first cost of the die sets by giving much longer service.

Forgings are now being recommended for die sets, being claimed to have more uniform structure and greater strength. In addition, delays encountered in obtaining special die-set castings are eliminated by the purchase of standard forged sets. Special die sets may be forged in any thickness. The die sets are held to extreme limits of accuracy, variations on the pins being held to 0.0001 in., in squareness, 0.005 in. in 6 in., and in parallelism 0.002 in. in 12 inches.

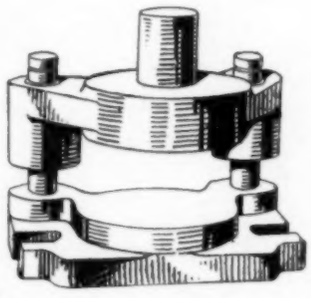
Six supplementary shapes of die sets are illustrated on this page, all of forged construction. Fig. 1 is a round die set designed to meet ordinary requirements for making round stampings. An easy way of mounting dies on the pads is provided. Pins are in the rear, out of the way, and yet support the punchholder properly. All parts are interchangeable.

A round set with pins on center is shown in Fig. 2. This set can be used when strips of metal are to be passed between the pins. The die set may be used with pins set directly in front of the operator, or with open sides to the operator for cupping, piercing, or similar operations. The set is obtainable with plain bearings or with hardened and ground steel bushings.

The forged overhang-type die set is shown in Fig. 3. This set is designed to take extra-wide metal. It is called "overhang-type" because of the longer distance from front to rear than from left to right.

Die sets for Henry & Wright dieing machines are shown in Figs. 4, 5, and 6. The sets are laid out to pass onto the bolster plate between the guide rods of the machine without removal of the machine head. Other styles available for unusual jobs require head removal. The 2-pin rear die set in Fig. 4 is useful for small dies to be mounted on 10- or 25-ton machines. A 2-pin diagonal set for 25- and 50-ton machines is illustrated in Fig. 5. This design allows for an extra large working surface and at the same time provides for easy mounting of sets between the guide rods of the machine. The curved contour allows the set to enter between guide rods by a slight shift from left to right.

A 4-pin set for 25- and 50-ton machines is shown in Fig. 6. This is a universal type, with maximum die space provided in relation to the total width. Ample clamping surfaces are provided on the punch and die holder.



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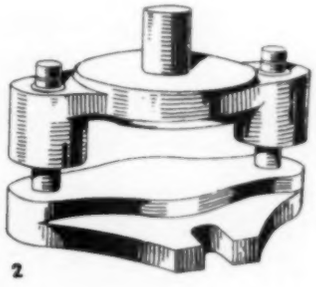

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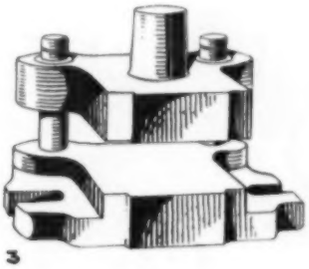

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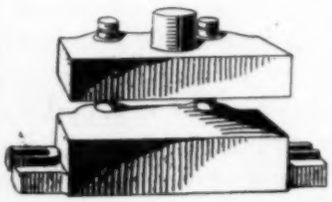

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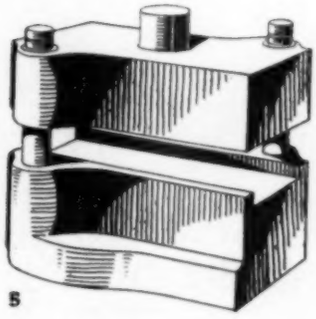

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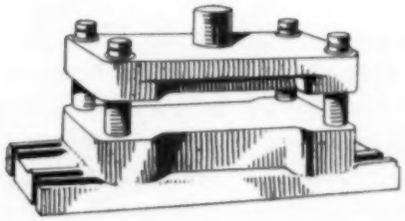

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American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

Vol. 72 NEW YORK, MARCH 27, 1930 No. 13

No Nonsense From a Fact

DARE IT BE suggested in this year of congressional elections that every report of depression, of unemployment, and of economic maladjustment should be most carefully scrutinized before acceptance? Though senatorial privilege be sacred and senatorial integrity be unquestioned, one must consider that 32 senators out of 96 are either going to be in or out; 267 representatives out of 435 are subject to autumn replacement, leaving a lonesome 168 sure of a stay of execution.

Hungry and anticipant candidates, to the number of 299, (multiplied at least by two, because both major parties will have at least one candidate) can be extremely vocal. The temptation to distort a fact for political purposes is always great; it is even greater when one's purpose is both political and personal. As one British politician said of another, "He never could stand any damned nonsense from a fact."

*

According to the Rules

IN THESE difficult days when there is not employment enough to go around, many a manufacturer has had to face a serious responsibility. It is not his fault, of course, if customers run short of funds or develop abnormal bumps of caution and stop buying, but when that happens he usually has to curtail operations and dismiss men or put them on short time.

According to the old unwritten rules it was quite proper for an employer to cut down his force ruthlessly when business declined. And according to the rules, it was the obligation of the man discharged to find some way to keep himself and his family from hunger and privation until customers resumed buying and the plant could be started up again.

But within the last few years the rules have been somewhat modified. It is probably a fair statement to say that the majority of employers today feel a responsibility to the men in their employ, and do everything they can to provide work for them. Shortening of hours for the whole plant instead of laying off part of the men is one evidence that the rules are being changed.

But the rules are not yet what they should be. The employer can still abide by them with the utmost devotion and yet leave the worker to fend for himself in times of stress. It is high time to develop new rules more in keeping with the spirit of the times, rules that will not permit nationwide business depressions and their accompanying unemployment.

*

If Laid End to End

IF THE general run of business prophets and prognosticators were laid end to end—it would be a good thing for business. So runs the current catchline, and there is a wealth of truth in it. Some there are who would add business statisticians; but, lo, there comes along a genuine, simonpure business satistician with genuinely useful figures, and takes much of the lightning out of their thunder.

Such a statistician must have assembled the following figures released by the Dartnell Corporation. These were the reasons underlying 200 losses of sales in a Midwest store:

Ignorance of Merchandise	50
Indifference	30
Improper Handling of Customer	23
Errors in Address	20
Out of Stock	17
Insolence of Salespeople	12
Customer Kept Waiting	11
Impatience with Customer	10
Promise not Kept	6
Condition of Stock	5
Unfamiliarity with Stock	15
Poor Merchandise	1
Total	200

Would that the same statistician might similarly analyze losses of sales to industry. But then again, it would be unnecessary. It is almost too obvious that ignorance of merchandise, indifference, and improper handling of customer are as potent sales-losers for industrial selling as for retail. Would that they, and the salesmen who belie their name, might also be laid end to end.

SHOP EQUIPMENT NEWS

Sebastian 11-Inch "Gold Seal" Heavy-Duty Lathe

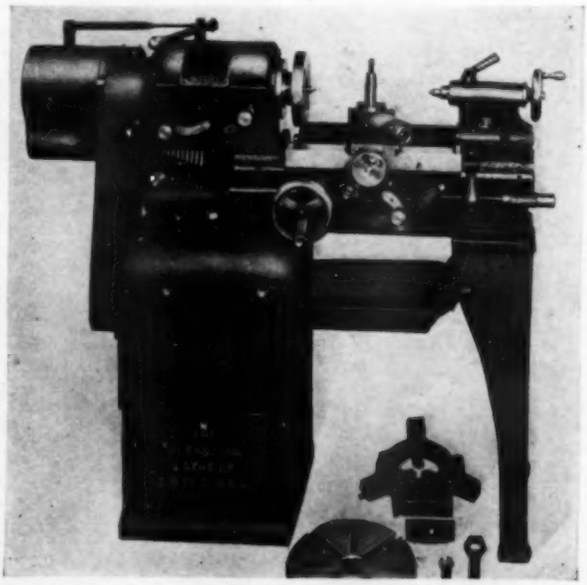
HIGH SPEED and precision are embodied in the 11-in. "Gold Seal" lathe announced by the Sebastian Lathe Company, Cincinnati, Ohio. This machine is suitable for production work and at the same time is built with accuracy for tool room application. It is claimed to be aligned with an accuracy of 0.0005 in. Although it is designated as an 11-in. lathe, it actually has a capacity equal to a 14-in. lathe in that it takes collets up to $\frac{7}{8}$ in., and has a $1\frac{5}{16}$-in. hole through the spindle.

This machine is claimed to be the heaviest 11-in. lathe built. The motor is built into the leg under the headstock, together with a cabinet for tools. Solid steel gears are employed throughout, and safety features are included. The motor chain is surrounded by cast-iron guards and an adjustment for the chain is provided. When a standard 1-hp., 1,200 r.p.m. motor is used, eight speeds are obtained over a range of 26 to 620 r.p.m., but with a two-speed motor, this range is extended to $19\frac{1}{2}$ to 930 rev. per minute.

The "Gold Seal" 11-inch lathe is made in 3-, 4-, 5-, 6-, and 8-ft. bed lengths, and has a swing over the bed of $12\frac{1}{16}$ in., and a swing over the carriage of $8\frac{3}{8}$ in. The distance taken between centers on a 4-ft. lathe is $22\frac{1}{2}$ inches.

The top slide of the compound rest travels 2 in. It will not run out and thus will not lose the benefit of the underneath support. From 6 to 96 threads per in. can be cut, and the reverse for cutting left-hand threads is obtained by simply throwing a tumbler into a different position. The feeds and threads are obtained through the two levers in the quick-change box and one sliding on the quick-change tumbler shaft. The feeds, which range from 0.00175 to 0.111 in., cannot be thrown in simultaneously. A safety shear pin is provided at the end of the quick-change box to prevent damage from overloads. Both starting and stopping of the lathe are controlled by a lever within easy reach of the operator, this lever in turn controlling the friction drive on the headstock.

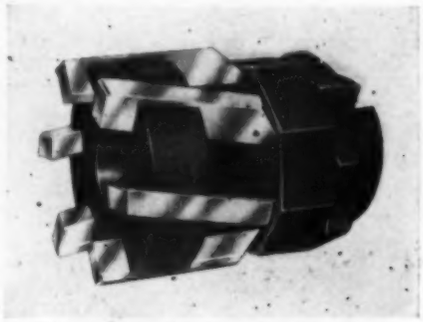
The approximate weight for the 4-ft. bed, crated, is 1,200 pounds.



Sebastian 11-Inch "Gold Seal" Heavy-Duty Lathe, which has a Timkenized headstock and a range of spindle speeds from $19\frac{1}{2}$ to 930 r.p.m. with a two-speed motor. The chip pan is an extra

Davis Cylinder Boring Head

A cylinder boring head particularly designed for rough boring cylinders, but suitable for any rough boring or semi-finishing work, has been announced by the Davis Boring Tool Company, 6200 Maple Ave., St. Louis, Mo. The boring head body is manufactured from high-carbon, nickel steel which is heat-treated for toughness to resist torsional strain and wear. High-speed steel blades are furnished regularly, but Stellite and tungsten-carbide-tipped blades can be supplied.



Davis Cylinder Boring Head, which is intended primarily for rough boring or semi-finishing operations

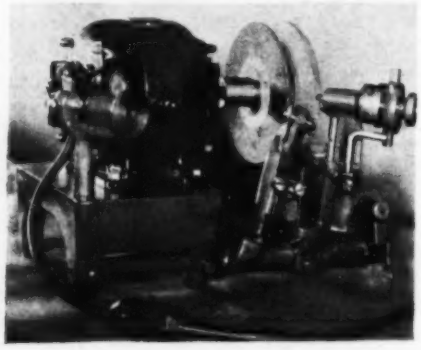
All blades of this boring head are locked from the front, and thus the cutting thrust is taken against the back and bottom of the slots, giving a full metal-to-metal bearing. This gives rigidity and minimizes chatter. The blades are placed at an angle in the body to keep the outer diameter clear of the bore except at the cutting point. Heating is thus minimized.

Roughing heads of this type are constructed so that the blades recede from the diameter at an angle. When the blades need regrinding, they are brought forward uniformly and simultaneously by means of a ring adjusting nut, and reground on the face only. Semi-finishing heads are similarly constructed with the exception of a short land on the blade to give a smooth bore. Boring heads of standard dimensions can be furnished with front pilots, rear pilots, shanks, or drives to suit requirements.

Wells Drill Grinder

A drill grinder powered by a $\frac{1}{6}$-hp. motor has been placed on the market by the Wells Manufacturing Company, P. O. Box 613, Greenfield, Mass. Drills up to $\frac{1}{4}$ in. can be

sharpened. A draw-in chuck held in a quill and provided with a draw-in rod is used to hold the drill for the grinding operation. Before grinding the drill, it is put into the lining-up holder shown at the left of the machine and fixed in the correct position. After this operation the drill and the quill are inserted in the grinding fixture at the right. A cam

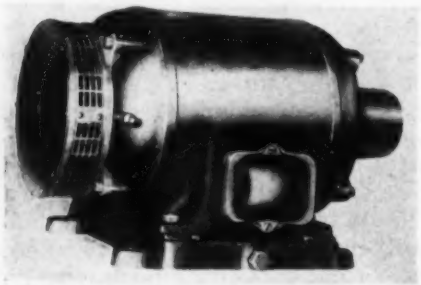


Wells Drill Sharpener, which will take up the ¼ in. drills

and swing motion causes the drill to be moved across the face of the grinding wheel. The point is also thinned on an emery wheel held in a fixture. A diamond wheel dresser is supplied.

Century Totally-Inclosed Fan-Cooled Motors

The inclosed, fan-cooled, squirrel-cage, induction motors placed on the market by Century Electric Company, 1806 Pine St., St. Louis, Mo.,



Century Totally-Inclosed, Fan-Cooled Motor

have the same dimensions as standard open style motors, but they have the added advantages of full protection to the stator, rotor, and other internal parts. This prevents the entrance of dust and dirt, the inclosure being made by ribbed cast-iron guards. There are no rubbing seals or air gaps. Machined fits are used.

As will be noted from the illustration, the fan and fan housing are mounted externally on the front end of the motor. The cooling air is drawn in at the pulley end, circulated around and over the rear coil guard, through the air passages between the field core and the frame, out over the coil guard on the front end, and discharged into the air through the fan and fan housing. It is thus evident that a suction fan is employed.

The air passages are unobstructed and allow free passage of the cooling air. They may be blown out readily if this should become necessary, and the use of compressed air for cleaning will not force dust or dirt inside the motor.

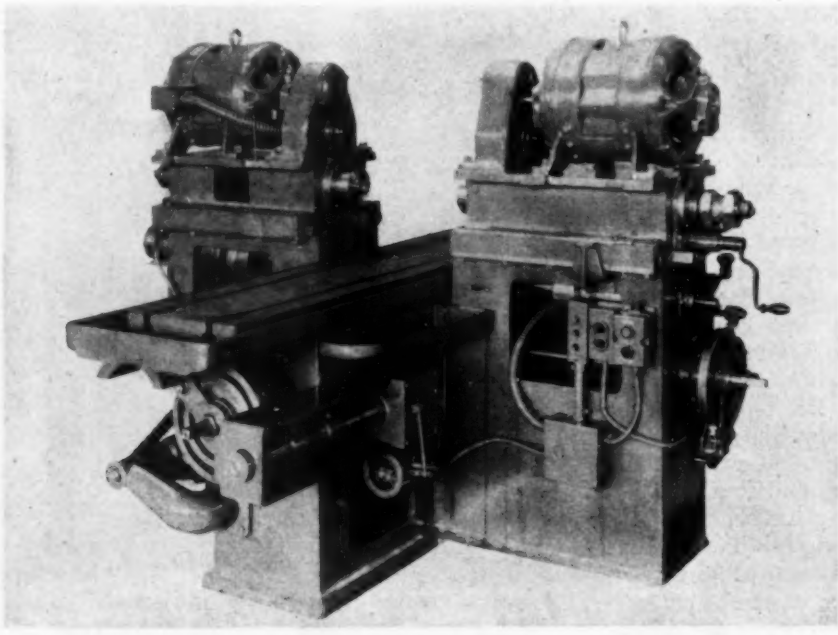
The fan blades are radial, which makes them equally effective regardless of the direction of rotation. Provisions are made to circulate the air within the motor shell and transfer the heat to the radiating surfaces. A heavy guard protects the fan.

Stamets Automatic Spline Milling Machine

FOR WORK larger than that accommodated by the usual automatic spline miller, a heavy-duty automatic model has been developed by William K. Stamets, Jenkins Arcade Building, Pittsburgh, Pa. This machine will cut slots through bars up to 9 in. in diameter, and single keyways in shafts up to 15 in. in diameter. It has a maximum distance between spindle ends of 26 in. and a minimum of 4 in. with a maximum total spindle infeed of 5 in. The distance from the center of the spindle to the table is 8 in., the working surface of the latter being 66x 14 in. The standard table travel is 24 in., and speeds range from 4 to 20 in. per min. A longer table can be furnished when specified.

Precision roller bearings carry the spindles, each of which is driven by a separate 2-hp. motor. There are four spindle speeds. The depth of cut is set by means of scale and vernier, and the automatic electric control stops the spindle after it feeds to the depth to which it has been set.

The table is driven by a screw direct connected through a silent chain and speed variation device to a 2-hp. 750 r.p.m. motor. The length of the table stroke is controlled by setting a positive stop on the screw shaft dial plate. This stops the



Stamets Heavy-Duty Automatic Spline Milling Machine, which will cut single keyways in shafts up to 15 in. in diameter

table at the same place at each end of each stroke. Reversing the table motor puts the table in reverse and can be done only after the table stops. A dwell is placed at each end of the stroke for the infeed of the cutter. This allows a deeper infeed than is practical where the infeed occurs toward the end of the stroke. The machine is heavily built.

Buhr Sliding-Arm Type Drilling and Tapping Heads

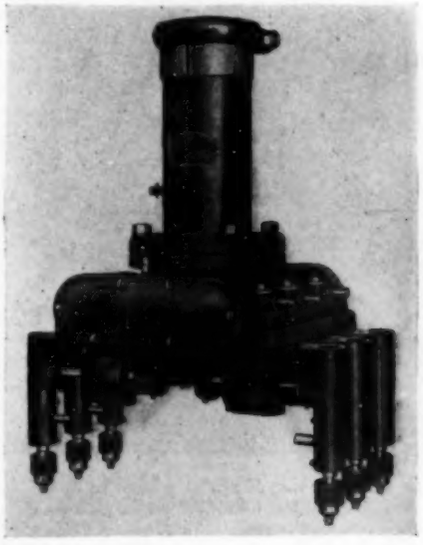
AN ALMOST unlimited range of adjustment is the principle feature of the sliding-arm type drilling and tapping heads announced by the Buhr Machine Tool Company, Ann Arbor, Mich. The minimum adjustment is governed by the diameter of the arm body, but the maximum adjustment is controlled by two factors; the size and shape of the drillhead housing, and the length of the arm slide. Standard housings and arms are employed on sizes up to those used on the firm's fully adjustable heads. Special housings are used where greater adjustments are required. They are furnished preferably in either round or rectangular form.

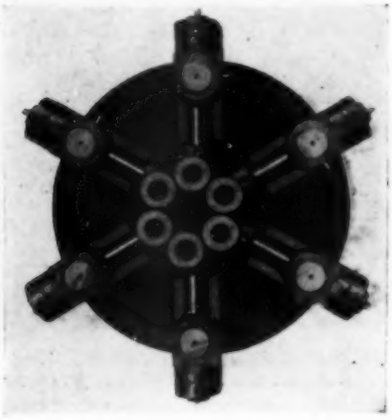
Two distinct methods of mounting may be used with the arms and the transmission which drives them. On the first type of head, the arm transmission pivots at the center proper, being centered on a dowel, permitting the arm to be swung radially about this pivot. At the same time the arm can slide in or out, the amount of movement depending upon the length of the arm slide. The other method consists of mounting the units, each unit consisting of an arm and the transmission which drives it, so that each individual unit may slide backward or forward, and can be set at any point within the range of the drillhead housing. These units slide over a horizontal shaft, which furnishes the drive. Therefore the minimum adjustment is governed by the diameter of the arm body, and the maximum by the size of the drillhead housing and the length of the arms. In the first type spur gears are used for the main drive, while in the second type the main drive is accomplished through bevel gears. Different speed ratios may be obtained for the arms as required, and they can be furnished with an individual reverse for tapping.

In the set-up each spindle is an independent unit. The spindle arm clamps against a flat surface and there is no deflection under the pressure of the maximum feeds. Parallel alignment is maintained under all conditions. A self-locking vertical adjustment is used as a standard on all of these heads.

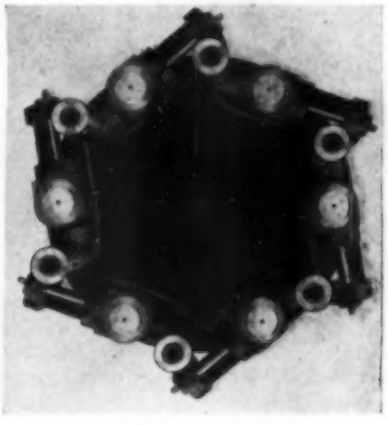
The spindles employed in these heads are made from 3135 S.A.E. steel, heat-treated, and are ground to several Morse tapers. Gears are made from No. 3 Maxell steel, heat-treated. Of the No. 0 type, the body and the arms are cast from aluminum, the Nos. 1 and 2 bodies are cast iron, and the arms are of crucible steel. Radial ball bearings are used to mount all moving parts, such as the spindles and the driver. Thrust bearings are used on the spindles and driver in addition to radial bearings. Idler gears are mounted on Hyatt roller bearings as standard.

The heads are made in four sizes, the Nos. 0, 0-2, 1, and 2, having capacities for $\frac{1}{4}$-, $\frac{5}{16}$-, $\frac{7}{16}$-, and $\frac{3}{4}$-in. drills, respectively. The minimum distance between centers of the spindles for these heads are $1\frac{1}{4}$, $1\frac{1}{2}$, $1\frac{3}{4}$, and $2\frac{1}{2}$ in. respectively.





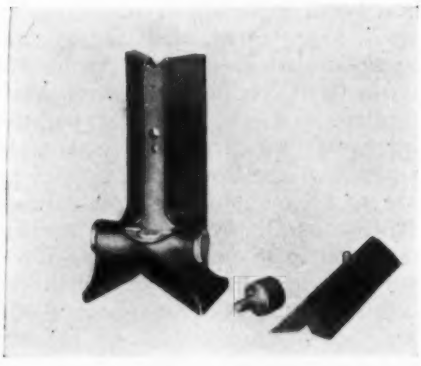
Left—Line set-up in rectangular body of Buhr Sliding-Arm Type Drilling heads. Center—Minimum adjustment with No. 2 heads and advanced taper in spindles. Right—Maximum center adjustment with No. 2 heads having advanced tapers



Bausch & Lomb Optical Centering Level

Setting up cylindrical work with relation to milling cutters, gear cutters, saws or drills is facilitated by the use of an optical centering level, as manufactured by the Bausch & Lomb Optical Company, Rochester, N. Y. It is claimed that with little practice a set-up can be made to within 0.001 in. in a fraction of the usual time.

The instrument has a short horizontal V and a long vertical V. Above the short V is a level vial, the air bubble of which is observed to determine the accuracy of a set-up. When placed in use, the centering



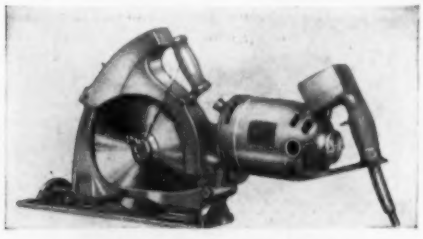
Bausch & Lomb Optical Centering Level

level is put on the machine table, using the short V as a base. If the table is not exactly level, the air bubble will be off center an amount that can be readily determined from the graduations on the vial.

After the work has been set properly and the cutter mounted on the arbor, the horizontal V is placed on the cylindrical work with both sides of the vertical V in contact with the cutter tooth. The cross-slide of the machine is then operated backward or forward until the air bubble assumes the same position as when the dial was placed upon the table. When this position has been obtained, the center line of the cutter teeth is in alignment with the axis of the work. The same principle is used in setting up milling cutters, saws, or drills.

Stanley-Crowe Safety Saw

The Crowe safety saws formerly manufactured by the Crowe Manufacturing Corporation, Cincinnati, Ohio, have been added to the line of portable electric tools manufactured by the Stanley Electric Tool Company, New Britain, Conn., and will be known as the "Stanley-Crowe" line. Four sizes are made to cut 2, 3, 4 and 6 in. deep, respectively. Blades can be furnished in cross-cut, rip, or combination types. Special blades can be furnished for cutting Bakelite, copper, and other non-ferrous materials.



Stanley-Crowe Safety Saw

The Stanley-Crowe saws are equipped throughout with ball bearings, and all parts are interchangeable so that replacement of worn parts can be made with a minimum of inconvenience. Standard arbors are used. The saw is easy to handle and is so constructed that the line of cutting can be followed without difficulty.

Putnam Square Billet Gouger

MOST billets contain certain small surface defects such as seams, broken surfaces, and scratches, and to remove them by means of a hand pneumatic chipping hammer often takes hours. For example, with skilled labor the average time in a large mill has been found to be between 2 and 3 hours. But to employ the usual planer type machine for this work is unsatisfactory, because when making a straight cut, it removes too much of the material in some places and not enough in others, since it can not follow the camber. Milling cutters are too slow in operation, the table feed being only a few inches per minute.

To permit placing the operation of stripping square billets on a production basis, and to eliminate the difficulty attendant upon usual methods, the Putnam Machine Works Division of Manning, Maxwell & Moore, Inc., Fitchburg, Mass., has designed a square billet gouger as illustrated in Fig. 1. This machine is of the planer type and has hydraulic operation, but is so designed that the cutting tool may be made to follow the camber of the billet. In consequence the billet is cleaned without removing too much material at any point.

Billets up to 6 in. square and in lengths of 10 ft. have been handled on this machine. In a recent test it has planed all over a 6 x 6-in. x 10 ft. 6 in. billet in 12 min., including the time required to set the billet in the machine and remove it after planing.

Among the features are: hydraulic operation, a massive cutter head,

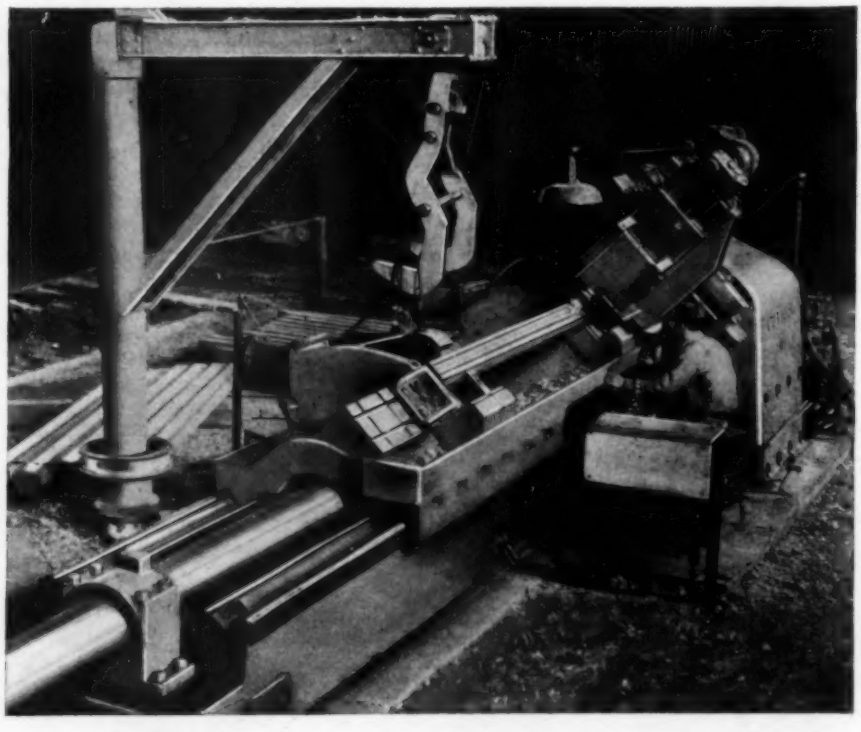


Fig. 1—Square billets 6 x 6 in. x 10 ft. 6 in. long can be gouged at a rate 10 to 40 times as fast as by the use of a hand pneumatic chipping hammer when mounted on this Putnam Square Billet Gouger

and the roll over. The billet is clamped on a table actuated by a hydraulic drive and working from left to right. This table can be operated at any cutting speed up to 30 ft. per min. with a return speed of approximately 50 ft. per min. The travel of the table is controlled by a walking beam treadle under the operator's feet. This treadle operates an air valve, which in turn controls the hydraulic valve of the drive. Pressure of the operator's right foot on the treadle causes the table to move in the cutting direction and pressure of the left foot reverses the table. Both hands are free to control the cutting tool into or across the billet, and this control is so sensitive that it permits the cutting tool to follow the camber as well as any crack in the billet in any direction, and almost with the same ease as if the cutting tool were held directly in the operator's hand. By providing the operator with a perfect control of the position of the cutting tool, the depth of the cut is made a matter of judgment at all times, and is unaffected by the camber of the billet.

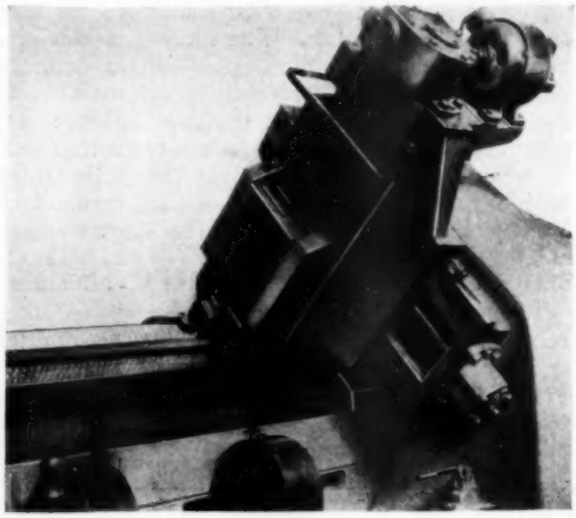


Fig. 2—Close-up of the cutting head, showing the massive construction. The two control handles in the foreground are for operating the tool in and out of the cut and across the face of the billet

The cutting tool is held in a massive head and is moved in two directions at right angles to each other. These movements are in and out of the cut and across the face of the billet. They are effected by the two controller handles, shown in front of the operator's seat, the controllers operating motors mounted on the tool head. Each of these motors is of 3 hp. and runs at 1,200 rev. per minute.

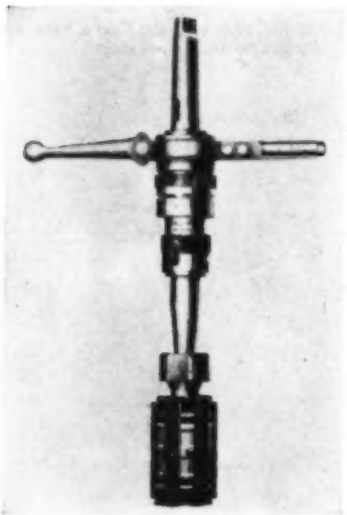
Hall Model HP Production Hone

For honing cast iron, steel, bronze, aluminum and die-cast metals on a production basis, the Hall Manufacturing Company, Toledo, Ohio, has introduced its Model HP production hones. These hones are available in sizes from 2 to 20 in. in diameter and in lengths from 4 to 12 inches.

As shown in the illustration, the driving and expanding mechanism is connected to the hone by a ball joint in the hollow driving tube. This tube is made in standard lengths, but can be lengthened or shortened to suit requirements. A standard No. 4 Morse taper shank is fitted unless other tapers are specified. The hone, driving tube, and expanding or connecting shaft can be quickly taken out of the upper mechanism by lifting the lower knurled collar and turning the driving tube to the left one-eighth of a turn, permitting it to drop free.

The expanding brake collar and the expanding handle, together with the rear roller extension, move up and down with the hone, but do not revolve. An upright guide must be fitted to the honing machine or drill press for the rollers to work in, thereby preventing the brake expanding mechanism from revolving. The upper knurled collar is attached through a slot to a round slotted flange, which in turn is fastened to the inner connecting or expanding rod. This rod runs down to the cone expanding screw in the hone. Therefore, when the hone is running, the operator presses the lever down to close the braking collar on the sleeve. This pressure backs up the knurled collar, until the limit of expansion of the hone has been reached. When the hone wears and it is necessary to increase the expansion in order to maintain the desired size, the operator lifts the upper knurled collar $\frac{1}{8}$ in. and turns it counter clockwise one or more graduations as desired. Each graduation is equivalent to another 0.0005-in. or 0.001-in. expansion.

After the desired size in the cylinder has been obtained, the machine is stopped and the operator turns the upper knurled sleeve to the left to collapse the hone before withdrawal. The hone is lifted up into its guide, which should be fitted to a position above the cylinder, and a new block or cylinder is set under and clamped in position. During honing, the operator presses down the expanding lever until it reaches the set limit stop. The tool will finish from 100 to 600 holes, according to the amount of metal removed and the hardness.



Hall Model HP Production Hone

Bohnalite Housings Now Used On "U. S." Tools

Bohnalite housings are now being used on all "U.S." $\frac{1}{4}$-, $\frac{5}{16}$-, and $\frac{3}{8}$-in. portable electric drills manufactured by the United States Electrical Tool Company, Cincinnati, Ohio, and also on the Nos. 1 and 2 screw drivers, valve grinders, and tappers. This metal is employed instead of aluminum, because the tools stand up better and longer.

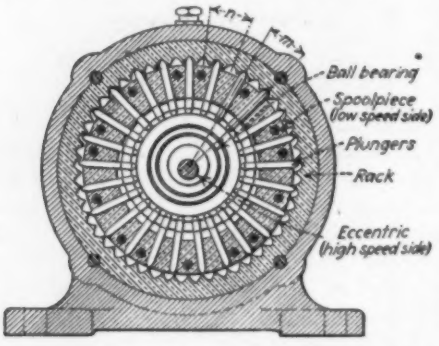
Accompanying this change is the

Bohnalite housings are now employed on "U. S." Drills, and they have been redesigned to make servicing easier

redesign of the $\frac{1}{4}$-, $\frac{5}{16}$-, and $\frac{3}{8}$-in. special "U.S." drills, which permits removing one side of the handle and housing end in one piece. This is shown in the accompanying illustration. With this construction the switch, wiring, and commutator are more easily accessible when servicing becomes necessary. The brushes also are quickly removed and replaced. Improved lines of the handle give increased gripping ease, and improve the appearance of the tool.

"Heliocentric" and "Revocentric" Speed Reducers

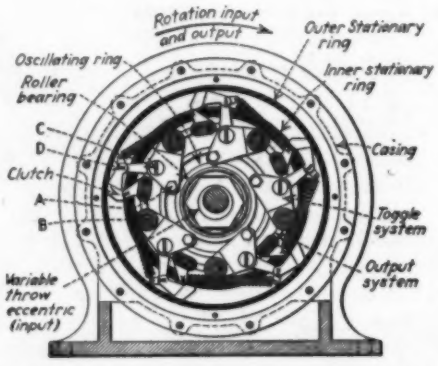
Two different types of speed reducers have been placed on the market by the Universal Gear Corporation, 327 South La Salle St., Chicago, Ill. The first is a fixed-ratio speed reducer known as the "Heliocentric," and the second, the "Revocentric," is an infinitely variable speed reducer. The former, which is shown below, consists of the casing, around the inner periphery of which is an internal gear rack. Inside of this is a spool piece carrying a number of plungers that bear at their inner ends upon an eccentric. The eccentric is driven at the high speed of the motor, and the construction of the apparatus is such that the spool piece connected to the low-speed side is driven at a reduced speed as the plungers are forced against the rack by the eccentric rotation. The "Heliocentric" reducer illustrated has 25 plungers and 49 rack teeth.



Cross-section of the "Heliocentric" Speed Reducer, which is a fixed-ratio type

Reducers of this type are made for reductions of 8 to 1 up to 60 to 1, and, by using two or more reducers in series, ratios as high as one million to 1 can be obtained. Sizes to transmit up to 50 hp. are available.

The "Revocentric" reducer consists of an adjustable throw eccentric on the input shaft driving five clutches through toggle joints, which are mounted between two disks on the output shaft.



A cross-section through the clutch mechanism of the "Revocentric" Infinitely Variable Speed-Drive. The letters refer to the various pivot points

Although not shown, the means for varying the throw of the eccentric are comparatively simple. By a handwheel or other method, the inner member of the hollow drive shaft is twisted with respect to the outer member by means of prongs, which are keyed to the inner shaft and slide in helical slots in the outer. This causes the inner and outer eccentric members of the cam to turn with respect to each other and vary the eccentricity from zero to a maximum.

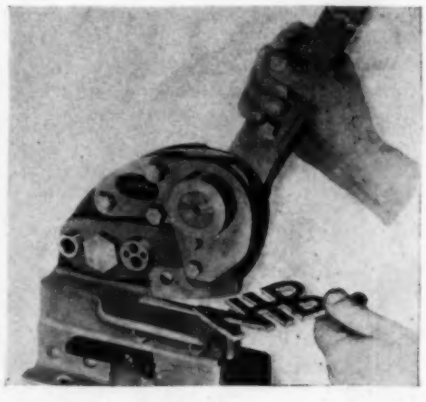
In the figure above, the eccentric rotates at the input speed. It carries on a roller bearing a ring, which is practically stationary with respect to the output system, but which oscillates as the eccentric rotates. This ring carries a toggle system pivoted to the ring at point *A*. The toggle is also pivoted to the output system at point *B*. The output system remains concentric with the casing. Hence as the oscillating ring is forced outward at point *A* by the rotation of the eccentric, the toggle pivots about *B* carrying the arm *CD* outward. This causes the clutch to pivot at *D* and jam between the inner and outer stationary rings. As the point *A* continues to be forced outward after the clutch has jammed, the point *C* is forced farther from the line *AD*, carrying the point *B* and hence the entire output system forward in a clockwise direction.

This reducer is infinitely variable in output speed from one-thirteenth of the input speed to zero. The speed may be varied while the gear is in motion and under load. It is available in sizes up to 15 horsepower.

"Handnib" No. 4 Nibbler and Rod Cutter

A heavy-duty Model 4 "Handnib" has been added to the line manufactured by the National Machine Tool Company, Racine, Wis. This tool will shear and nibble $\frac{3}{16}$-in. flat stock into any shape desired. It takes care of inside nibbling of various designs in sheet metal of the same capacity, and will also cut drill rod of cold rolled steel and any round stock of the following sizes: $\frac{3}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, $\frac{3}{8}$, and $\frac{1}{2}$ in. Blades for inside and outside nibbling may be interchanged by the removal of two small screws.

The body of the No. 4 "Handnib" is made of cast steel, and all wearing



"Handnib" No. 4 Heavy-Duty Model Outside and Inside Nibbler, Shear, and Rod Cutter

parts are hardened and ground. The double crank construction makes it possible to nibble or shear to capacity without strain or deflection. Three models are manufactured: the first is for outside nibbling, inside nibbling and shearing, and rod cutting; the second is for outside nibbling, inside nibbling and shearing, and the third is for shearing only.

Hevi Duty Floating-Belt-Type, Conveyor Furnace

UNIFORM heat-treating conditions are maintained constantly in the floating-belt-type, conveyor furnaces announced by the Hevi Duty Electric Company, Milwaukee, Wis. Labor has been reduced to a minimum since automatic charging and recovery of the parts may be provided for. The heat economy is high because of the heavy insulation of the side walls and roof, and because the return of the conveyor belt is inclosed, thus reducing lost heat from this source to a minimum.

This furnace is known as the floating belt type, because the conveyor is supported on driven rollers throughout, and is not dragged across the hearth. The conveyor consists of a woven wire mesh belt of heat-resisting, nickel-chromium alloy wire of $\frac{3}{16}$ mesh and will support work of this diameter without its becoming caught in the meshes. Upturned edges prevent the work from dropping off at the sides, the edges being sufficiently flexible to pass easily around the driving drums.

By avoiding the necessity of a hearth plate, the bottom heating elements radiate directly through the conveyor to the work and by constant revolution the heated portions of the rolls are continually in contact with the conveyor. Rapid heating results, therefore, and scale is minimized. A relatively small chamber is required for a given rate of production, since a hearth area of only $1\frac{1}{2}$ by 12 ft. is required to heat 1,000 lb. of small parts an hour to a temperature of 1,550 deg. F. Different sizes of work may be put through the furnace at the proper speed, the limits of belt travel being from 3 to 12 in. per minute. Loading densities as high as 30 lb. per sq. ft. have been found practicable. The furnace may be had in five standard sizes with production rates of 250 to 1,400 lb. per hour.

Fig. 2—Delivery end of a floating-belt-type conveyor furnacce. The quench tank can be furnished with a flight conveyor for removing the work

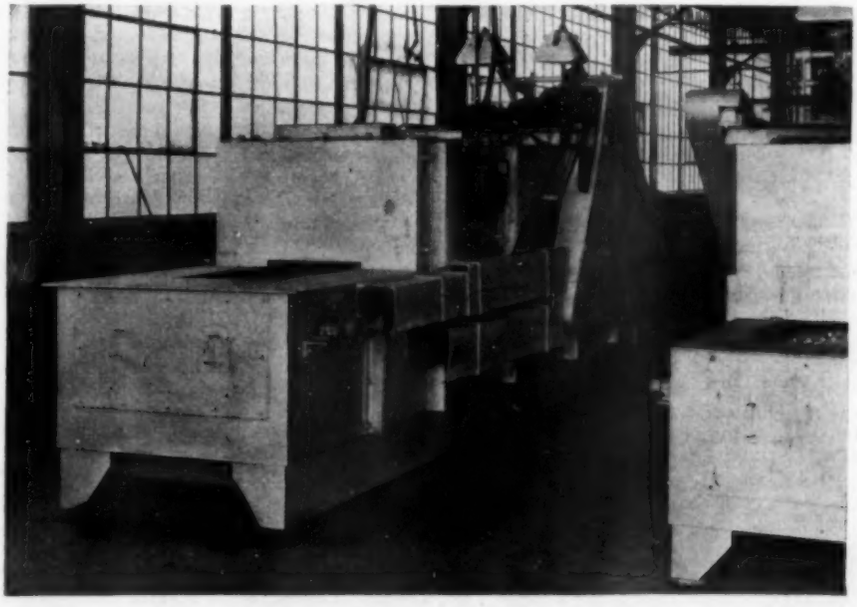


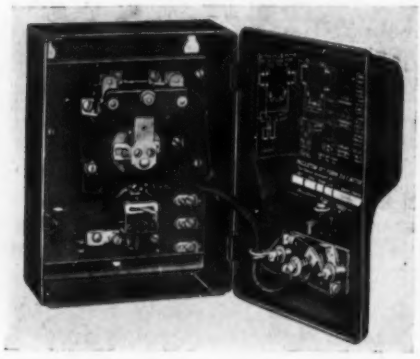
Fig. 1—View from the charging end of the Hevi Duty Floating-Belt-Type Conveyor Furnace, showing the removable end section for access to the conveyor

The conveyor drive consists of a motor, speed reducer and variable-speed transmission mounted upon the furnace roof and connected to the rollers by a roller chain.

Quench tanks can be furnished in either single or double types. The latter is used where both oil and water quenches are needed. The tank is movable laterally and two discharge chutes are provided.

Allen-Bradley Bulletin 707 Single-Phase Starting Switch

For motors operating pumps, compressors and other equipment by either two-wire or three-wire control, a Bulletin 707, single-phase starting

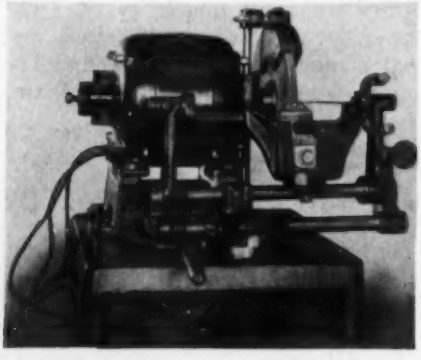


Allen-Bradley Bulletin 707 Single-Phase Starting Switch, which is a double-pole magnetic type

switch has been developed by the Allen-Bradley Company, 286 Greenfield Ave., Milwaukee, Wis. This switch is a double-pole magnetic type with a thermal overload relay, and has a maximum rating of 1½ hp. at 110 volts or 3 hp. at 220 volts. A feature is the operating coil, which has a double winding for series-parallel connections, permitting the switch to be used interchangeably up to and including 1½ hp. for 110- or 220-volt motors by simply changing the terminal connections of the operating coil. This feature increases the flexibility of the switch and reduces the number of switches to be carried to meet normal requirements. It can be furnished with stop and start push bottons in the cover, without push buttons, and with a two-way lever switch. It is inclosed in a sturdy steel case.

Wells Round Cutter Grinder

Any round edge cutter from ⅛ to ½ in. thick and from 2 to 4 in. in diameter can be sharpened on this machine. The unit has been placed on the market by the Wells Manufacturing Co., P. O. Box 613, Greenfield, Massachusetts.



Wells Round Cutter Grinder, which will take cutters from ⅛ to ½ in. thick and 2 to 4 in. in diameter

Simple operation is a feature of the device. The cutter is merely swung in front of the wheel and the index rests upon the tooth being sharpened. Any arc of a circle can be obtained. The grinder is furnished for 110 or 220 volts a.c. or d.c. All adjustments are easy to operate. A diamond dresser goes with the machine to true the wheel.

TRADE PUBLICATIONS

BORING TOOLS. The Davis Boring Tool Co., 6200 Maple Ave., St. Louis, Mo., has published bulletin No. 102 in which the improved type "L" boring tools are fully illustrated and described. Specifications and prices are listed.

BRASS, COPPER AND BRONZE—WAREHOUSE STOCK. The Chase Brass & Copper Co., Inc., 80 Lafayette St., New York, N. Y., has issued stock list No. 5 on its brass, copper and bronze shapes, strip, sheet and other products in warehouse stock. The booklet is indexed for ready reference.

CONTRACT SHOP. The Cramp Manufacturing Corporation, 2850 Fulton Boulevard, Chicago, Ill., has just issued a unique bulletin describing pictorially its facilities for handling jig and fixture work on a contract basis. On the cover is a highly imaginative picture in color, and the rest of the booklet is in rotogravure with a large size photograph on each page depicting various sections of the shop. Appended is a complete list of equipment, comprising over a hundred machine tools. The bulletin contains sixteen 9x12-in. pages.

FLEXIBLE SHAFT HANDBOOK. The S. S. White Dental Manufacturing Co., Industrial Division, New York, N. Y., has published the "Flexible Shaft Handbook," which contains five sections on: applications of flexible shafts; characteristics and the construction of flexible shafts; drive shaft ends; casings and casing ends, and shaft and casing combinations. It will be seen that the handbook is an exhaustive treatise on flexible shafts in machine design. Many photographs and diagrams are used throughout. The handbook contains 119, 7½x5-in. pages.

GEARS. The Grant Gear Works, Inc., Boston, Mass., has published a catalog of its stock and special gears for industrial use. Other products listed are Bakelite pinions, roller chains, silent chains, and several types of speed reducers. The catalog contains 143, 6x4-in. pages.

LADDERS, SAFETY TYPE. The Dayton Safety Ladder Co., Dayton, Ohio, has published several leaflets showing the uses and sizes of its safety ladder. Complete specifications are listed.

MOTOR CONTROL SELECTION. Cutler-Hammer, Inc., 80 12th St., Milwaukee, Wis., has published a booklet entitled "Practical Pointers on the Selection of Motor Control," which tells how to choose control to suit the motor's load, and how to select control for d.c. and a.c. motors. Numerous photographs are used to explain the text. The booklet contains 32, 9x6-in. pages.

NICKEL ALLOY STEEL PRODUCTS, BUYER'S GUIDE. The International Nickel Co., Inc., 67 Wall St., New York, N. Y., has published a "Buyer's Guide for Nickel Alloy Steel Products," as of January 1, 1930. A list is given of manufacturers of the various products which are arranged alphabetically. The listing contains several hundred widely diversified products.

PYROMETERS. The Wilson-Maeulen Co., Inc., 383 Concord Ave., New York, N. Y., has published catalog L-3, which is a reproduction of the complete catalog and is up-to-date, including the section covering the new potentiometer recorder. A second bulletin entitled "An Inspection Tour of Industrial Plants" shows various of the company's automatic temperature controllers in use on several types of furnaces.

REAMERS. The Foster-Johnson Reamer Co., Elkhart, Ind., has published catalog No. 30 showing its expanding type hand reamers for air brakes, general purposes, and also in an adjustabie type. A reamer sharpener and surface plates are other products listed. The catalog is replete with photographs. It contains 64, 9x6-in. pages.

TAPS AND DIES. The National Acme Co., 170 East 131st St., Cleveland, Ohio, has published a catalog on "Namco" taps and dies. The catalog is made up of nine distinct bulletins, each of which is complete in itself and presents the salient features of a single line. Specifications, diagrams, and photographs are found in each.

UDYLITE PROCESS. The Udylite Process Co., 3220 Bellevue Ave., Detroit, Mich. has published a booklet on the "Udylite Process," giving material on the protective qualities of cadmium, physical properties, simplicity of application, economies, necessary equipment, advantages, results of special tests, and finally a list of "Udylite" jobbing shops, arranged by states.

NEWS
OF THE WEEK

Machine-Tool Order Volume Decrease Slows, Upturn Expected Soon

ORDER trends still point downward for February, according to the monthly report of the National Machine Tool Builders' Association. However, the rate of recession is checked, there being only a slight drop in the three-months average curve under January, as compared to a 12 per cent drop in the curve from December to January and an 11 per cent drop from November to December. Shipments were heavier in February than in January in spite of the shorter month. However, at 214 the rate of shipment is considerably below the 300 mark reached in five different months in 1929. Unfilled orders are being reduced, but they still represent a little better than two months' shipments. This is a fair backlog at the present rate of demand. The index of unfilled orders for February was 541 as compared with 565 for January and 701.6 for February of last year.

Surprisingly, the group comprising the middle-size companies among those reporting made the best showing for February with an index of new orders at 201.9, which is 27 per cent greater than that of January. Their shipments index at 242.6 is likewise considerably above the indexes of the other two groups. The smaller companies show orders above 200 and only slightly below those of January. The group representing the largest companies made the poorest showing, comparatively, with their orders index 19 per cent below that of January. In the case of all three classes, however, the three-months average has not yet reversed its downward trend, although this seems due to happen soon.

* * * *

Federal Aid and Road Machinery—Politics and Unemployment—Can Unemployment Be Forestalled?—Tap Dimensions and Gage Standards—Tariff Changes

By Paul Wooton

Washington Correspondent, American Machinist

WASHINGTON, D. C., March 26—Discussions of the differences between the Federal-aid bills passed by the House and that approved by the Senate are in progress at this writing. There is no indication as yet that the deadlock has been broken but some compromise is a daily possibility. Such pressure has been brought on the conferees by the administration, by state highway officials and others interested in road construction that it seems unlikely that the impasse can continue much longer. As it is the conferees are being charged with having contributed materially to unemployment.

The action of Samuel Eckels, chief engineer of the State Highway Department of Pennsylvania, in having called a meeting of the representatives of the material, construction and equipment interests to urge the early placing of orders for aggregates and equipment is being commended in Washington as a very effective step in support of the President's public works program. By placing orders for road-building materials and road-building machinery in advance, requirements could be taken care of in an orderly way. It is pointed out that the manufacture of contractors' equipment is seasonal. Unless orders are placed as far in advance as possible, peaks are created which the manufacturers cannot meet and consequently considerable time is lost before delivery.

With next summer's congressional campaign in the offing, the enactment of legislation to determine the facts about unemployment may be too much to expect from Congress. A record revealing that present conditions ever were considered so serious as to warrant preventive legislation might be embarrassing later in the year when returning prosperity is hailed as permanent acquisition.

With the hobo fraternity as an interested audience, the Senate Commerce Committee gave Senator Wagner a hearing on his bills to provide an all-industry index of employment, to set up a national chain of labor clearing houses and to establish long-range planning of public works, but his plea for recognizing unemployment as a recurrent evil that should be battled against, rather than minimized, was greeted with little enthusiasm. The hoboes also desired to put in a word or two, but were squelched. Senator Hiram Johnson's comment that the measures proposed by Senator Wagner might tend to slightly alleviate unemployment probably has consigned them to limbo.

President Hoover's emergency program for the construction of public works now is gaining full force. Contracts let for public works and public utilities exceed all peace-time records for the months of January and February and it is expected that the March total also will reach a new high figure for that month. John M. Gries, director-general of the public works program, states that the figures are positive evidence that public officials and the public utilities are living up to their commitments under the President's program.

Some disposition is evident in Congress to consider seriously legislative measures that have been proposed to forestall unemployment in future industrial recessions, but with improvement in present conditions probable as Spring advances, it is uncertain whether this program will be carried through to final enactment. The Senate Commerce Committee now is studying preventive measures proposed by Senator Wagner. These bills contemplate expansion of the present Bureau of Labor Statistics to provide complete information monthly of the volume and trend in employment, the establishment of a national chain of public employment offices supported equally by federal and state appropriations and the creation of a federal employment stabilization board to take charge of the long-range planning of public works for the purpose of absorbing unemployed labor during periods of business depression.

A meeting of the National Screw Thread Commission is scheduled at the Bureau of Standards in Washington on April 9. One of the outstanding topics will be a proposed co-operative investigation to determine present screw-thread practice throughout the country. The session also will consider dimensions and tolerances for cut thread taps (Report B5C-1929, Sectional Committee on Small Tools and Machine Tool Elements). Revision of the Commission's screw thread standard report will be discussed as proposed by a subcommittee on standardization and unification. Miscellaneous subjects are: Fire hose thread used on the Pacific Coast; threads for metal barrels and drums; and threads for gas cylinder valves. Delegates to the Tokyo World Engineering Congress will report. Col. J. O. Johnson represented the Screw Thread Commission at this international meeting.

Recommended commercial standards for plain and thread plug and ring gage blanks are now in print as Miscellaneous Publication No. 100 of the Bureau of Standards. They are available at 15 cents per copy at the Government Printing Office in Washington. This report is the result of three years' work by the American Gage Design Committee co-operating with industry under the chairmanship of Col. J. O. Johnson of the Army Ordnance. It covers diameters from 0.059 in. to 4½ in., including most of the commercial sizes in ordinary use.

Tariff changes on several mineral and metal items passed by the Senate as a Committee on the Whole have been sustained by later action after the bill reached the Senate on March 4. Aluminum keeps its reductions, pig and scrap from 5 to 2 cents per lb., sheet and bar from 9 to 3½ cents, and aluminum utensils from 11 cents per lb., plus 55 per cent down to a flat 25 per cent *ad valorem*. Pig iron is at 75 cents per ton. The additional duty of 1.30 cents per lb. on hollow drill steel valued over 4 cents per lb. is deleted.

The special duty reductions granted on the basis of licenses issued by the Polish Minister of Finance, on the importation into Poland of machinery and equipment not manufactured in Poland, which amounted, effective Jan. 1, 1930, to 35 per cent of the normal tariff rate, is discontinued for an indefinite period, according to a radiogram from Commercial Attache Clayton Lane, Warsaw, received in the Department of Commerce.

* * *

Western Metal Congress To Be Held in Frisco

The second biennial National Western Metal Congress and Exposition will be held in the Civic Auditorium at San Francisco, the week of Feb. 16, 1931, W. H. Eisenman, secretary of the American Society for Steel Treating, announced recently. A general committee of four, headed by Ivan L. Johnson, superintendent of the Best Steel Casting Co., Oakland, Calif., has been formed to handle the local arrangements. The other members are Frank B. Drake, president of the Johnson Gear Co., Berkeley, Myron Bird, vice-president, California Saw Works, San Francisco, and R. S. Hirst, Hall-Scott Motor Car Co., Berkeley.

Western sections of twelve national societies will co-operate with the American Society for Steel Treating in arranging the technical programs and organizing the exhibition. Floor plans of the auditorium are now in preparation and when completed will be mailed to exhibitors by Mr. Eisenman.

The first National Western Metal Congress and Exposition was held at the Shrine Auditorium, Los Angeles, in January, 1929. At that time a total of 176 companies exhibited. It is believed that this show will be larger.

Slotted Head Standards Issued for Acceptance

The proposed standard for slotted head proportions on machine screws, cap screws, and wood screws, has been transmitted to the American Standards Association for approval and designation as an "American Standard" by the S.A.E. and the A.S.M.E., joint sponsors for the project. The proposed standard is the result of eight years of work since the appointment of the original committee, 14 drafts and re-drafts having been prepared and distributed for criticism and comment. Approximately 800 copies of these various drafts were duplicated and mailed by the sponsor body. In its final form the standard was published in the journals of the sponsor societies.

* * *

Stanley Electric Tool Purchases Unishear

The Stanley Electric Tool Co., a subsidiary of the Stanley Works, New Britain, Conn., has purchased the trade name, stock on hand, tools, jigs, and fixtures, of the Unishear Co., 270 Lafayette St., New York City, and will continue the manufacture and development at the main plant in New Britain.

* * *

Export Managers Hold Annual Get-Together

Export executives of the country met in New York at the Hotel Pennsylvania on March 18 for an all-day and evening session under the auspices of the Export Managers Club of New York. Speakers at the morning session included R. L. Bracken, export manager, the Millers Falls Co., Paul R. Mahoney, executive vice-president, International B. F. Goodrich Corporation, E. M. Fisher, manager foreign division, Fairbanks Morse & Co., and Marston Haviland. Speakers of the afternoon were H. H. Reeves, International General Electric Co., Philip B. Deane, York Safe & Lock Co., and Bennett Chapple, Armco International Corporation. F. H. Sisson, vice-president of the Guaranty Trust Co., and Thomas J. Watson, president and general manager of the International Business Machines Corporation, spoke at the dinner session.

* * *

Grossmann to Lecture At Metals Congress

M. A. Grossmann, chief metallurgical engineer of the Central Alloy Steel Corporation, Canton, Ohio, will deliver the Edward De Mille Campbell Memorial Lecture at the twelfth annual National Metal Congress, according to an announcement by W. H. Eisenman, secretary of the American Society for Steel Treating, which sponsors the lecture.

The National Metal Congress and the National Metal Exposition will be held this year in Chicago during the week of Sept. 22. The Campbell Lecture will be delivered on Sept. 24 at the Stevens Hotel before the annual meeting of the Society.

Mr. Grossmann is the author of numerous technical papers and is co-author of "Physical Metallography." He was graduated from the Massachusetts Institute of Technology in 1911, and after a year of teaching, was successively connected with the Pittsburgh Testing Laboratories, Vanadium Corporation of America, U. S. Bureau of Standards, Electric Alloy Steel Co., Atlas Steel Corporation, United Alloy Steel Corporation, and since 1926, with the Central Alloy Steel Corporation.

* * *

Young Brothers Company Makes Staff Changes

The Young Brothers Co., Detroit, has added several members to its engineering staff to act as service engineers in branch offices. D. E. Anderson, former member of the staff of the Carrier Engineering Corporation, has been appointed to serve the New England territory with headquarters at 10 High St., Boston. P. A. Meyer, representative of the company for 8 years in the western New York territory, has been brought into the main office in Detroit for general service. G. C. Becher, until recently with the Ruud Manufacturing Co. in the New York district, will take over the duties and position vacated by Mr. Meyer in his old territory. Mr. Becher's office address will be 908 Ellicott Square, Buffalo. J. J. Ferris, until recently representing the Carrier Engineering Corporation, has been appointed to assist Mr. Thatcher in the New York territory with offices at 30 Church St., New York.

* * *

Soviet Expect to Spend Two Billion This Year

Approximately $2,000,000,000 will be the total capital investments in Soviet industry during 1929-1930, the second year of the Five-Year Plan for the economic upbuilding of Soviet Russia. This is twice the amount expended during the first year of the plan and 50 per cent more than was originally scheduled. How the results of the first year of operations under the Plan substantially exceeded the expectations of the original industrial program is revealed in the first accurate and detailed report of the year, by the Amtorg Trading Corporation, New York.

* * *

Steel Founders' Meeting Planned This Week

The Steel Founders' Society of America will hold its March meeting at the Statler Hotel, St. Louis, on Thursday of this week. A variety of topics will be discussed, among them the regular business of the Society, and reports of cost, industrial and technical research.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine-tool business

THE following reports, gathered from the various machinery and machine-tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

NEW YORK

There is little change in the New York machinery and machine-tool market. Dealers expect things to happen within the next week or two, but actual orders have still to justify their predictions. There is general, desultory buying, from no particular industries and in no particularly large quantities. What demand there is, is for no predominant type of tool or for any special purpose, but just to replace some piece of equipment that has at last given up the ghost. Prices and deliveries are unchanged from last week. The only list to appear lately is a series of small ones from the General Electric. Conditions generally seem to be much better, however, and many dealers expect to make March considerably better than February on the basis of orders which they will be able to close between now and the end of the month.

CLEVELAND

There has been very little change in the machinery and machine-tool situation for the past ten days. Business is quiet with only a small number of orders materializing. Sales are generally limited to single tools. The principal buyer was the steel industry. Some concerns report sales for the first quarter as being 40 to 50 per cent below those of the same period of last year. Buying by the automobile plants has been dormant, but sales representatives report greater activity, with a possibility that this industry will resume buying during April.

An encouraging feature is the increase in the number of inquiries. Combined with the large amount of business pending it is evident that a general upward swing is nearing. The Westinghouse Electric & Manufacturing Co. is preparing a list of tools for the recently acquired Hill Clutch plant in Cleveland, which will be retooled for the manufacture of flood lights.

DETROIT

Although automobile production has been increasing during the past six weeks, the market for machinery and machine tools in the Detroit area has been worse during this period than at any time in many years.

Not only have sales dropped to unusually low levels but there are almost no inquiries and apparently there is no immediate prospect of an improvement. Sales during March were substantially lower than those in February, which was not a particularly good month, although better than January.

Some manufacturers, machinery dealers, and general observers believe that conditions will improve considerably between now and May, but this belief is not general. The auto manufacturers are not optimistic, although they are making plans for increased production. New men are being added to the payrolls and the hours of employment are being increased steadily, but there is no tendency on the part of the manufacturers to buy machinery. They do not discuss conditions and apparently are marking time.

NEW ENGLAND

Promise reflected in opinions of a week ago were not upheld in the New England section. The week was featureless and devoid of other than routine transactions. Buyers seemed to have no definite interest in placing orders for required machinery. Reports from some industrial centers were better than others reflecting uneven, spotty transactions.

With the first quarter of the year drawing rapidly to a close, it may be said, the machine-tool market has not reached conservative predictions, especially during March. While a better than slight improvement was expected in the volume of orders for new machine tools, it is now apparent total March transactions will be only on a comparative basis with the month of February. Improvement in any instance will be slight.

BUFFALO

Conditions in western New York in the machine tool and electrical equipment trade still continue to be spotty. Most of those reporting declare that they can see no improvement in business over conditions of a fortnight or a month ago.

The buying continues to be done, when it is done at all, by small shops and industries. With the exception of the Bethlehem Steel Co., which is still making large improvements, practically none of the big industries are in the market. There are, however, a very few inquiries out for equipment from some of the others. But the tendency seems to be not to buy if possible.

Fortunately there is considerable buying for municipal and state construction projects, of which there are several under way.

CHICAGO

Indications that business in machine-tools and machinery in general is on the up grade have been noted during the last few days. Sales have increased in volume, inquiries are keeping up, and, while the improvement is not large, the trend is perceptibly upward. Several industrialists who have been holding off, some of them for months, evidently have sent in their orders. Manufacturers of farm implements and tractors are out with new lists of required shop equipment, and railroads are finding need for tools additional to those included in former lists.

The International Harvester Co., the General Electric Co. and the Allis-Chalmers Manufacturing Co. are among the concerns stimulating the machine-tool market at present. The automobile and auto accessory industries are believed to be about ready to start buying equipment needed for the increased production activities forecast for an early date. Another source from which machinery interests soon may be expected to benefit largely is the road construction machinery industry.

CINCINNATI

There was very little change in conditions in the general market during the past week, according to reports of machine-tool manufacturers of the Cincinnati district. This branch of the trade did a little better than in the previous week, and because of this it is a feeling that a livelier market is in the offing.

The majority of the manufacturers made a slight gain in the first three weeks of the present month, as compared with the same period of the previous month. All have enough business booked to keep their plants busy for some time to come, and for this reason weekly fluctuations in sales will not affect manufacturing activity. Orders are being filled without any undue delay.

Selling agents report that business held to a fair level in the week; that they developed a good number of prospects in the period. While no large business is in sight in local and adjacent territory, it is thought that an increase will come from the development of small orders.

PHILADELPHIA

Leaders of the machinery and machine-tool industry in this market view the industrial situation optimistically. There has been some conservative buying from large plant industries, notably from the steel trade, and some orders from Eastern carriers. Some improvement was noted in the radio industry.

So far as small equipment is concerned, the situation appears to be somewhat spotty, although some firms have closed rather substantial orders, and still have work on their books which will keep them running for some three months. Inquiries have been quite profuse and, coming from a well-scattered area and from substantial firms, are indicative of early orders.

Dealers and sales agents here find the automobile industry has not measured up to expectations.

INDIANAPOLIS

Some slight improvement is seen in the machinery and machine-tool field here, but the demand continues to be spotted, some industrial users making few if any purchases, while others seem fairly active. The iron and steel business is in good shape, judging from the demand for tools in the local field. Particularly is the demand very good from the fabricators of construction steel, and the outlook from this source is brighter than it was this time last year. In fact, machine men say the future in this line will result in considerably more sales than last year.

Automobile business continues in the doldrums. Tooling demands from the factories in this section at least, are not so good and only an average spring and summer demand is expected.

MILWAUKEE

Purchases by a number of the leading local and nearby industries have been largely responsible for an upturn in activity in the metal-working equipment trade, but as a rule, the situation remains quiet and rather featureless. In most instances, buying reflects more or less pressing needs, which consists almost entirely of replacements made necessary by obsolescence or in the course of the effort to effect economies in production costs by the introduction of latest types of labor-saving equipment. The increasingly active state of inquiry is considered a sign of encouragement to support hopes that a definite revival in machinery business may be looked for momentarily. Expressions of opinion among leaders in the industry are more cheerful perhaps than at any time since last fall.

A significant development locally is the gradual increase in the number of men at work in foundries and machine shops. A few of the largest plants have more men at work than a year ago, although the average shop has not yet regained a payroll equivalent to the 1929 peak.

BUSINESS · BAROMETER

Summer of excellent trade expected if Congressional storms do not break and cheerful attitude continues

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

IN ATTEMPTING to solve the riddle of the business future there are two sets of influences that must always be taken into account. One includes the major occurrences by which events are shaped; the other the minor happenings which seem to be without effect and which are soon forgotten. We are always disposed to underestimate the importance of the former and to overestimate that of the latter.

The other evening a college professor insisted that the discovery of the new planet whose visibility was predicted by Percival Lowell was the most important news given to the world since the Copernican theory was accepted. A few minutes afterward a politician speaking over the radio was heard to insist that society would be destroyed if Prohibition was repealed. Of course, both statements are exaggerations. The new planet may greatly advance the progress of science, and Prohibition may be very desirable, but those who assume that either is essential to civilization do not take into consideration the armor of self-protection with which mankind is provided, individually as well as collectively.

There are some medical scientists who believe that an anti-toxin for every disease has been or will be discovered, and it is certain that our economic ills yield to treatment more readily than they used to. A period of hard times that would last more than a year has become almost unthinkable in this country, and the depression engendered by the stock market crash of last autumn is rapidly disappearing.

Of recent good news the most striking and important is the decline in money rates to the lowest levels since 1924. Call money has been available at 1½ per cent; and a reduction of the New York Reserve Bank rediscount rate to 3 per cent is expected as the logical sequence of another cut in the Bank of England rate and nine successive reductions in acceptance rates in the past three weeks. It is clear that something of a plethora of credit is being accumulated all over the world and that money is likely to cost little for some time to come. This will immensely encourage the business revival for which most of the forecasters are looking.

The facts in regard to unemployment are difficult to obtain, but after weighing all the reports received one is forced to conclude that most of the industrious are, or shortly will be, able to get work at fair wages.

The volume of business is keeping up surprisingly well when all things are considered. There are some pessimists who have become destructive in their instincts. One of these groups includes a few men and women who seem opposed to the chain-store industry. They are disparaging its growth in every way, and trying to undermine its credit as well as its management. The success of these attacks is, however, very doubtful, and while some of the chain-store organizations may have been overcapitalized, most of them are performing a desirable public service.

The steel industry is fairly busy and though the mills have no large backlogs of orders, second-quarter business, which is traditionally heavy, is still ahead of them. Therefore, no further decline in production is expected. The automobile manufacturers are in a similar position; their output during the first quarter has been relatively small, but their best months for sales are still ahead and production will quickly be increased as retail business expands.

The consolidation of the Chase National Bank and the Equitable Trust Company, together with another smaller institution, has created the largest bank in the world. It will be called the new Chase National Bank, and its aggregate resources will come very near to three billion dollars. There are some signs of opposition to this and other similar consolidations, but no one seems to fear that they will be prevented, and the movement now under way in Congress to permit more widespread branch-banking shows that the public attitude toward concentrations of banking is gradually being changed.

Railroad traffic as indicated by car loadings is still somewhat below last year, but the decline is not abnormal.

There is nothing particularly new in the European situation. The optimists are still hopeful that the London Conference will agree upon partial disarmament, and that resulting economies may greatly help the cause of peace.

Taking it all in all we seem to be entering the spring in a more cheerful spirit, and its persistence augurs a continued revival in American trade. We have the cheapest money in five or six years; the unemployment has been greatly exaggerated; the speculative energies of the people appear to be unrestrained; and if the political clouds that overhang Congress are not followed by a severe storm we ought to have a summer of excellent trade.

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From this page the reader will get a quick picture of current business and industry. The boxed material below is a summary of the letters from regional correspondents of the American Machinist, published in full on the opposite page

MACHINERY and machine-tool markets are for the most part unchanged from last week. Two cities, Detroit and Milwaukee, offer sharply contrasted market conditions, Detroit reporting poorer conditions, Milwaukee reporting better. The situation is generally one of "watchful waiting" on the part of prospects, all waiting for someone to "break the ice." Routine transactions are the order of the day, and therefore, there are no changes in prices or delivery schedules. Demand is for single items for replacement, with the used-tool market poor. The unusual number of inquiries continues in most centers.

CHICAGO expects better business as the Spring opens. Buffalo demand is still spotty. New England industry is fairly active, but few machines are being bought. Indianapolis reports slightly better demand, particularly from iron and steel companies. Cincinnati manufacturers made a slight gain, shared also by the dealers there. Milwaukee activity is greater, with automobile parts makers adding men and increasing production.

DETROIT activity is as low as it has been for some time, the quietness extending also to inquiries. New York conditions are changed but little from those of last week, desultory buying for immediate needs governing the selling. Cleveland sales are limited to single tools, principally to the steel industry. Philadelphia is optimistic, but has little buying to back its optimism. Steel interests, railroads, and the radio industry are buyers there.

Quad City Founders Hosts at Regional Meeting with Foundrymen

THE first regional meeting ever held by the American Foundrymen's Association in co-operation with a district foundrymen's association was held in Moline, Ill., on Wednesday, March 26. This event, sponsored jointly by the A.F.A. and the Quad City Foundrymen's Association, attracted a large number of foundrymen from the Middle West and elsewhere to take part in an interesting and informative program.

Throughout the entire morning, inspection trips were made to plants in the Quad Cities district, which includes Moline, East Moline, and Rock Island, Ill., and Davenport and Bettendorf, Iowa. One of the largest foundry centers in the country, this territory includes fully 37 foundries—22 producing gray iron castings, 10 non-ferrous, three malleable, and two steel castings.

This section has long been important in the production of agricultural implements, and today contains some of the largest shops in the United States producing castings for agricultural purposes. Among the more important plants maintaining foundries are those of the John Deere Co., Moline Implement Co. and Rock Island Plow Company.

At 12:15 p.m., six round-table luncheon meetings were held, covering cupola practice, steel and malleable founding, gating and risering, nonferrous practice, and foundry costs.

Later, a technical session was held, with two papers scheduled for reading and discussion. R. F. Harrington, Hunt-Spiller Manufacturing Corporation, Boston, and chairman of the A.F.A. Sub-Committee on Foundry Sand Reclamation, dealt with "Foundry Sand Control." The other paper was by E. W. Page, Victor X-Ray Corporation, Chicago, on the subject of "X-Ray Examination of Castings." A banquet was served at 6:30 in the evening, at which the chief speaker was S. W. Utley, Detroit Steel Casting Co., Detroit, a director and past president of the Association.

* * *

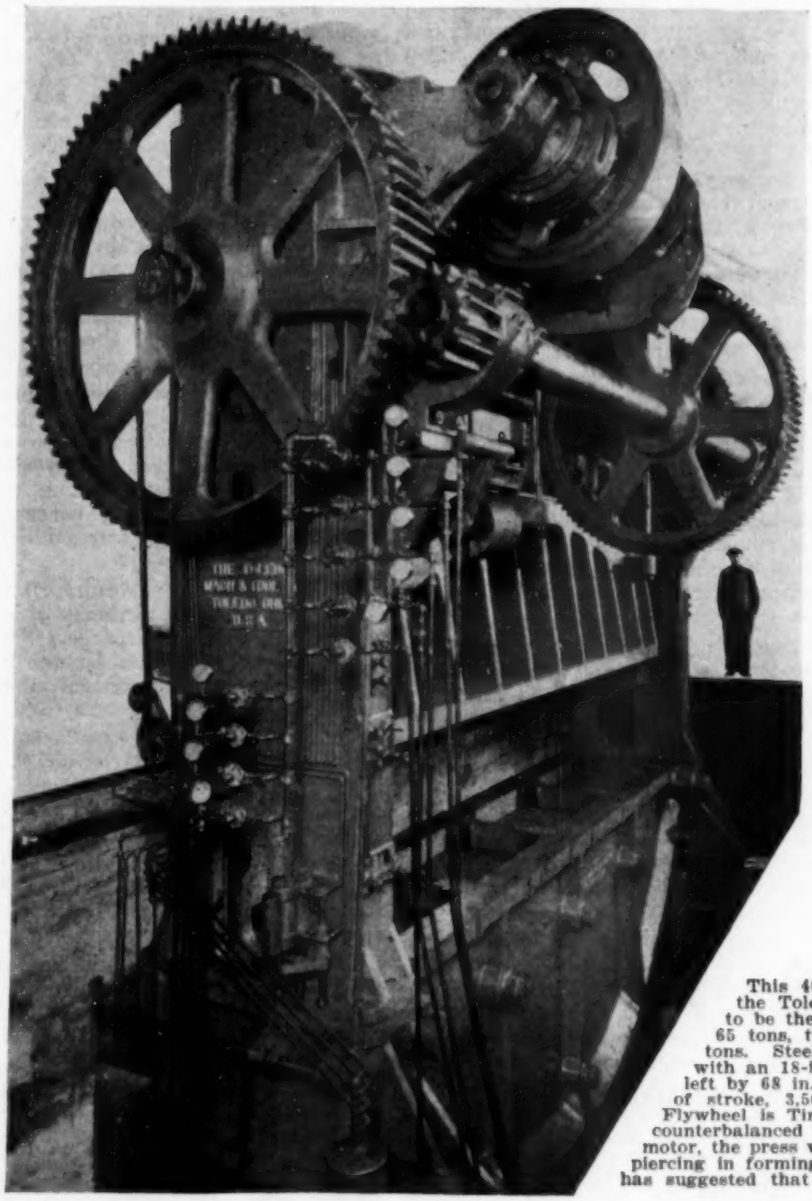
Foundry Equipment Orders Show 12 per Cent Gain

Foundry equipment orders, according to the Foundry Equipment Manufacturers Association, increased 30 points during the month of February. The index of gross orders for January was 160 on a base of the average monthly shipments for 1922-24 taken as 100. This may be compared with 196.4 for February and 197 for February of last year. The three-month average was 188 for February, as compared with 165.6 for January, and 181.3 for February of last year. The index of shipments was lower in February, being 169.6, as compared with 223.6 for January and 214.8 for February of last year. Unfilled orders showed a slight increase, being indexed at 424.7, as compared with 395.6 for January and 321.2 for February of last year.

* * *

Coffin Awards Given General Electric Employees

Of the 70,000 employees of the General Electric Co., 37 who during 1929 saved money for the company or contributed to its efficiency in an unusual degree, have been given awards under the Charles A. Coffin Foundation. The awards in each case consists of a certificate of merit and a substantial sum of money. Many of the men made suggestions which mean a definite annual saving to the company. In nine cases these savings have been estimated and the total figures up to more than $1,250,000 a year. By far the larger number of the recipients, 24, are factory workmen or foremen. Ten of the recipients are engineers or laboratory men and the other three are commercial men.



Another Big One

This 400-ton crank press, built for the Soviets by the Toledo (Ohio) Machine & Tool Co., is believed to be the world's largest to date. The crown weighs 65 tons, the slide 65 tons, and the bed complete, 150 tons. Steel crankshaft gears are 140 in. in diameter with an 18-in. face. The bed measures, 288 in. right to left by 68 in. front to back. Pressure exerted at bottom of stroke, 3,500,000 lb. Total height of press is 35 ft. Flywheel is Timken mounted, clutch is air-controlled, slide counterbalanced with four air cylinders. Driven by a 150-hp. motor, the press will be used for heavy blanking, forming, and piercing in forming truck rails and similar pieces. Some wag has suggested that it may be used in stamping out religion.

Business Items

The Holdfast-Chain Co., Manchester, Iowa, will move to Cedar Falls, Iowa, this spring and is erecting a new one-story factory plant, 33x60 ft., for its factory use. Dr. W. L. Hearst was recently elected president; A. H. Refshauge, vice-president; T. B. Holst, secretary-treasurer and B. P. Hansen, manager.

The Scott-Bansbach Machinery Co. has removed its offices and warehouse from 130 S. Clinton St. to 4607-4611 West 20th St., Chicago, where increased floor space has been obtained.

C. G. Claussen & Co., Inc., San Francisco, Calif., have opened a warehouse and offices in Oakland, Calif., for distribution of iron and steel products, pipe, valves, fittings, engineering, and marine supplies. The warehouse building covers 30,000 sq.ft. and is equipped with an overhead crane system to handle heavy materials. Cutting equipment has been installed to produce special sizes and shapes. There is also a 40-ft. dipping tank for coating pipe and casing. C. A. Wall and C. C. Beatie will be resident managers.

Plans for the immediate erection of a plant in Klamath Falls, Ore., have been announced by Carl F. Gerlinger, president of the Klamath Locomotive & Machine Works, a newly formed corporation. The plans include the erection of eight buildings to house a complete locomotive, machine, and mill supply store. Among the articles to be manufactured will be Gerlinger lumber carriers, used extensively in the Northwestern mills, Pacific spark arresters, used in locomotives, and centrifugal water pumps.

Articles of re-organization have been filed with the secretary of state in Indianapolis by the Bantam Ball Bearing Company having a principal place of business in South Bend. The corporation has an initial capital stock of 8,000 shares having a declared par value of $25 each and is formed "to manufacture, buy, sell, and deal in machinery of all kinds." The first board of directors is composed of Karl L. Herrmann, Eugene H. Miller Sr., William Happ, Richard Breed, and William Happ, Jr.

The National Bronze & Aluminum Foundry Co., Cleveland, has completed a furnace which is claimed to be the largest single unit ever built in the world for the production of aluminum. The furnace has a daily capacity of 150,000 lb. and weighs over 175 tons. It is operated entirely mechanically, the raw material being charged at one end and the finished product delivered at the other. The furnace produces standard alloy aluminum in a highly refined and purified state.

The E. F. Keating Co., 452 Water St., New York; Himelblau-Agazim & Co., 30 North Dearborn St., Chicago, and the Stewart Machinery Co., Buder Building, St. Louis, Mo., have been appointed distributors by Tube-Turns, Inc., Louisville. Each of these companies will carry complete stocks of Tube-Turns of the standard types. W. P. Curley and A. L. Breyvogel will continue as managers of the New York and Chicago branch offices, respectively.

The Ganschow Division of Gears & Forgings, Inc., has moved to its new location at 2108-2120 North Natchez Ave., Chicago. The new location provides approximately 30,000 sq.ft. of manufacturing space. William Ganschow, vice-president and manager of the division, will continue to direct its operations. The Chicago district sales office will be in charge of C. F. Goedke, district sales manager, who will be located at the new plant.

The B. F. Sturtevant Co., Berkeley, Calif., plans to erect a new $1,000,000 plant in Berkeley. Construction of the first unit of the factory will be started within the next three years as the lease on the present plant expires in 1933. The new factory is planned to cover 50,000 sq.ft. of floor space and will employ between 100 and 150 workmen. The company is a subsidiary of the V.B.F. Sturtevant Co., Boston.

The W. F. & John Barnes Co., Rockford, Ill., has announced the formation of a new division, the John S. Barnes Corporation. This concern will produce a new line of automatic machinery. John S. Barnes, son of the original John Barnes, is president; C. H. Rystrom vice-president in charge of sales; E. J. Svenson, vice-president in charge of engineering; and W. W. Barton, secretary and treasurer.

Tourtellotte-Bradley, Inc., distributor of building specialties, Seattle, Wash., has announced the establishment of a steel casement manufacturing plant at 2012 Fifteenth Ave., West, in that city. Approximately $30,000 has been expended for equipment, including automatic electric welders, cutoff saws, and similar tools. This is said to be the first factory of this type in the Pacific Northwest.

Purchase of the Stetson-Ross Machine Co. plant at 3204 First Avenue South, Seattle, Wash., by a group of Pacific Northwest lumbermen headed by E. D. Kingsley, president of the West Oregon Lumber Co., Linnton, Ore., has been announced. The Stetson company manufactures planers and other woodworking machinery and is said to be the only plant of its kind west of the Mississippi River.

The Martin-Decker Corporation, formerly the Martin-Loomis Corporation, has announced its removal from 2827 Cherry Ave., to 3433-45 Cherry Ave., Long Beach, Calif. The company has erected a new shop, with three bays of sawtooth type, and is of steel.

The United Engine & Machine Co., San Leandro, Calif., will occupy a new $25,000 plant in April. The plant will employ 50 workmen and will specialize in patented pistons for automobile concerns in the San Francisco Bay district. The firm has headquarters in Fresno, Calif. L. S. Pratt is the San Leandro representative.

The Standard Steel Specialty Co., Beaver Falls, Pa., has purchased 11 acres of land at Hammond, Ind., in the Chicago industrial district, for a western plant, according to word recently circulated in Chicago. It is understood that the main building of the plant will be 100x200 ft. and construction work will start shortly.

At a price stated to be in the neighborhood of $500,000 the Vulcan Engineering Works, Ltd., has purchased the plant of the Vulcan Iron Works, Ltd., Vancouver, B. C. The plant is situated on Granville Island, Vancouver. A. L. Hiles is manager.

The Fageol Motors Co. will open a factory branch in Vancouver, B. C., according to announcement of H. C. Arnot, Northwest manager for the company under the direct supervision of the Fageol factory.

Personals

C. Brigham Allen, Jr., has been appointed district sales representative of the Philadelphia office of the Reliance Electric & Engineering Co., Cleveland.

Frank W. Curtis, until recently connected with the P. R. Mallory & Co. Inc., Indianapolis, Ind., as chief engineer in charge of "Carboloy" manufacture and development, has joined the Kearney & Trecker Corporation, Milwaukee, as research engineer.

Thomas Fitzsimmons, superintendent of the Denver plant of the Griffin Wheel Co., entertained department heads, foremen, and families at a dinner to celebrate the awarding of a silver cup by the national concern to the Denver plant as a result of a safety contest.

Frank B. Hamerly, Aurora, Ill., was elected vice-president in charge of manufacturing of the Independent Pneumatic Tool Co., 600 West Jackson Boulevard, Chicago, at the annual meeting on March 12.

Theodore Hill has been appointed sales manager of the Detroit Gray Iron Foundry Co., Detroit, Michigan.

Robert A. Horner has been appointed acting sales manager of the machine and small-tool divisions of the Barber-Colman Co., Rockford, Ill., to succeed the late Frank G. Hoffman, who died suddenly in February.

W. A. Marschke has been appointed Indiana representative of sanders, grinders and saws for the Porter-Cable Machine Co., Syracuse, New York.

J. L. Pratt and C. E. Wilson, vice-presidents of General Motors Corporation and heads of the accessories division, were in Anderson, Ind., recently, inspecting the plants of the Delco Remy Co. and the Guide Lamp Co., both subsidiaries of General Motors.

WALTER L. STELBACH, general chairman of the Forest City-Walworth Run Foundry Co. and Ralph H. West, vice-chairman of the West Steel Castings Co., have been appointed to the executive committee for the Cleveland convention of the American Foundrymen's Association, from May 12 to 16.

DENNIS F. SWORDS of Swords Bros., Rockford, Ill., has purchased the Aurora (Ill.) Metal Cabinet Works, 445 Woodlawn Ave. The Aurora plant will become a branch of the Rockford factory and the new owner is contemplating an expansion program.

SIDNEY WASLEY, formerly manager of the Youngstown district sales office of the Mathews Conveyor Co., Ellwood City, Pa., has been promoted to the managership of the Pittsburgh district sales office. He will have as his assistant Albert M. Kerr, who has been located in the home office sales department. The Pittsburgh district office has been moved from the McCance Block to the new Grant Building.

Obituaries

NATHANIEL C. ROBBINS, New York advertising sales representative of *Power* and a former advertising staff member on *American Machinist*, died on Sunday, March 16, following an illness of three months. Born in Nyack 57 years ago, Mr. Robbins graduated from Cornell University in 1894. After service in the Spanish American War, he became associated with the *American Machinist*. He served that publication, the Hill Publishing Co. which purchased it, and its successor, the McGraw-Hill Publishing Co., from 1900 until the time of his death.

PETER JUNKERSFELD, vice-president of the Stone & Webster Engineering Corporation, New York, died suddenly on March 18 at his home in Scarsdale, N. Y. He was 60 years of age and had been in his office during the day. Mr. Junkersfeld entered the service of the Chicago Edison Co. in 1895 and remained there for 24 years, becoming head of the engineering department before his resignation. He was also an associate member of the Naval Consulting Board, appointed by Secretary of the Navy Daniels during the World War.

WILLIAM G. SCHNEIDER, 77, inventor, mechanic, former manufacturer, and a partner in the machine shop operated as Hensel & Schneider at Kenton, Ohio, died on March 14. Mr. Schneider was also the founder of the Kenton Gasoline Engine Co., of which he was president for several years.

WILLIAM HINRICHS, prominent manufacturer of Milwaukee, first president of the Wisconsin Bridge & Iron Co., and an executive of the Wisconsin Motor Manufacturing Co., died in New York City recently after a brief illness.

JAMES R. HARRIS, 56, vice-president and general manager of the Busch-Sulzer Bros.-Diesel Engine Co., died at his home in St. Louis on March 12 after an illness of a year. He had been associated with the company since 1909.

JAMES J. CAMPBELL, 63, vice-president of the Carnegie Steel Co., died in Pasadena, Calif., on March 17. Mr. Campbell, who became vice-president in 1927, had been associated with the Carnegie company for 43 years.

WILLIAM J. LONGMORE, consulting purchasing agent for the Westinghouse Electric & Manufacturing Co., succumbed to pneumonia on March 4 at his home in Bellevue, Pa. He had been

connected with the Westinghouse company since 1886 and had been identified with the purchasing department during the past 50 years. He was perhaps the longest in continuous service of any man in the employ of the Westinghouse company.

HARRY L. HALDEMAN, 59, president of the Pacific Pipe & Supply Co., Los Angeles, died in that city on March 10. Mr. Haldeman was with the Crane Co., Chicago, from 1902 to 1910.

WILLIAM N. KUHNS, 72, president of Kuhns Bros. Co., Dayton, Ohio, died recently at his home in Dayton. He and his brother organized the Kuhns Brothers company in 1888.

CHARLES L. NEWCOMB, 75, who retired in 1927 as manager of the Deane Works of the Worthington Pump & Machinery Corporation, died at his home in Holyoke, Mass., on March 13.

HARRY M. MEIER, former president of the Simmons Hardware Co., St. Louis, died at his home in Pasadena, Calif., on March 12 at the age of 79.

EMANUEL MORSE FELTON, 87, chairman of the board of the Chicago Great Western Railroad, died in Chicago on March 11.

Forthcoming Meetings

STEEL FOUNDERS' SOCIETY OE AMERICA—Regular March meeting, Statler Hotel, St. Louis, Mo., March 27.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS—Fiftieth Anniversary celebration. Opens in New York, April 5, afternoon in Hoboken; April 6 in New York; April 7, 8, and 9 in Washington, D. C., at the Mayflower Hotel. Calvin W. Rice, 29 West 39th St., New York City, secretary.

AMERICAN WELDING SOCIETY—Annual meeting at Society headquarters, New York City, April 22-25. M. M. Kelly, 33 West 39th St., New York, is secretary.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION—General Cost Conference at Hotel Cleveland, Cleveland, Ohio, April 22-23. E. F. DuBrul, 1415 Enquirer Bldg., Cincinnati, is general manager.

NATIONAL POWER SHOW — Held in connection with the International Textile Exposition, Mechanics Bldg., Boston, Mass., April 28 to May 3. For information write to New England Association of Commercial Engineers, 53 Devonshire Road, Boston.

AMERICAN FOUNDRYMEN'S ASSOCIATION — Annual Convention, Cleveland Public Auditorium, Cleveland, Ohio, May 12-17. C. E. Hoyt, 222 W. Adams St., Chicago, is secretary-treasurer.

NATIONAL FOREIGN TRADE COUNCIL —Convention at Hotel Biltmore, Los Angeles, May 21-23. O. K. Davis, 1 Hanover Square, New York City, is secretary.

SOCIETY OF AUTOMOTIVE ENGINEERS —1930 Summer Meeting, French Lick Springs Hotel, French Lick Springs, Ind., May 25-29. National headquarters are at the Engineering Societies Bldg., 29 W. 39th St., New York City.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Semi-annual meeting, Hotel Book-Cadillac, Detroit, June 2 to 12. Calvin W. Rice, 29 West 39th St., New York City, is secretary.

NATIONAL ASSOCIATION OF FOREMEN —Convention at Toledo, Ohio, June 6-7. Harry J. Baumker, 316 Tenth St., Toledo, is convention secretary.

STEEL INDUSTRY'S EXECUTIVES—Annual Iron & Steel Exposition. Under the sponsorship of the Iron & Steel Electrical Engineers, June 16-20, Broadway Auditorium, Buffalo, N. Y. John F. Kelly, 1010 Empire Bldg., Pittsburgh, Pa., is managing director.

AMERICAN SOCIETY FOR TESTING MATERIALS—Annual meeting, Haddon Hall, Atlantic City, N. J. June 23-27. C. L. Warwick, 1315 Spruce Street, Philadelphia, is secretary-treasurer.

STEEL FOUNDERS' SOCIETY OF AMERICA—Semi-annual convention, Greenbrier Hotel, White Sulphur Springs, Va., June 26-27. G. P. Rogers, 932 Graybar Bldg., New York City, is managing director.

INTERNATIONAL CONGRESS FOR GENERAL MECHANICS — Liege, Belgium, Aug. 31 to Sept. 7. For information address Alb. Schlag, 4 Place Saint Lumbert, Liege, Belgium.

THE WEEKLY PRICE GUIDE . . . S

Rise and Fall of the Market

FOR two weeks in succession prices of basic materials have drooped. Last week some of the steel items were affected. This week, however, declines are confined to non-ferrous metals, namely, tin, lead, zinc, solder, babbitt and scrap lead. Steel prices are steady. Plates for pipe lines appear to lead in current buying with sheets slowest in demand. Volume of structural steel sales is apparently keeping up to recent levels.

(All prices as of Mar. 21, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b:

CINCINNATI	
No. 2 Southern (silicon 1.75@2.25)	$17.69@$18.19
Northern Basic	19.90
Southern Ohio No. 2	19.90
NEW YORK—Tidewater Delivery	
No. 2 Southern (silicon 1.75@2.25)	19.50
BIRMINGHAM	
No. 2 Foundry (silicon 1.75@2.25)	15.00
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	21.76@22.26
Virginia No. 2	24.04
Basic	19.75@20.25
CHICAGO	
No. 2 Foundry, local (silicon 1.75@2.25)	20.00
No. 2 Foundry, Southern (silicon 1.75@2.25)	20.01
PITTSBURGH, including freight charge ($1.76) from Valley:	
No. 2 Foundry	20 26
Basic	20 26
Bessemer	20.76

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb:

Detroit	4.50
Cleveland	5.00
Cincinnati	4.50
New York	5.25
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.10	3.35†	3.30	3.60†
No. 12	2.15	3.45†	3.35	3.65†
No. 14	2.25	3.55†	3.45	3.70†
No. 16	2.35	3.65†	3.55	3.80†
Black				
Nos. 18 to 20	2.45	3.85†	3.55	3.70
No. 22	2.60	4.00†	3.70	3.85
No. 24	2.65	4.05†	3.75	3.90
No. 26	2.75	4.15†	3.85	4.00
No. 28	2.90	4.75†	4.00	4.15
Galvanized				
No. 10	2.60	3.90†	3.80	3.80
Nos. 12 to 14	2.70	4.00†	3.90	3.90
No. 16	2.80	4.10†	4.00	4.00
No. 18	2.95	4.25†	4.15	4.15
No. 20	3.10	4.40†	4.30	4.30
No. 22	3.15	4.45†	4.35	4.35*
No. 24	3.30	4.60†	4.50	4.50
No. 26	3.55	4.85†	4.75	4.75
No. 28	3.80	5.10†	5.00	5.00

*Light plates. †Up to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York		Cleveland		Chicago	
	Black	Galv.	Black	Galv.	Black	Galv.
1 to 3 in. butt	53.74%	41.2%	55.5%	43.5%	55.5%	42.5%
3½ to 6 in. lap	50.32%	37.78%	53.5%	40.5%	51.6%	39.0%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	—Diameter in Inches— External	Internal	Thickness Inches
⅛	$0.17	1.315	1.049	.133
¼	.23	1.66	1.38	.14
⅜	.27½	1.9	1.61	.145
½	.37	2.375	2.067	.154
⅝	.58½	2.875	2.469	.203
¾	.76½	3.5	3.068	.216
⅞	.92	4.0	3.548	.226
1	1.09	4.5	4.026	.237
1¼	1.48	5.563	5.047	.258
1½	1.92	6.625	6.065	.28
2	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb:

— Thickness — B.w.g. and Decimal Fractions		Outside Diameter in Inches ⅛	¼	⅜	½	1	1⅛	1¼
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	6.05	6.00	6.20
Hoop steel	4.25†	4.00	3.75†
Cold rolled strip steel	6.25	6.00	6.10
Floor plates	5.10†	5.30	5.00†
Cold drawn, round or hexagon‡	3.40	3.65	3.60
Cold drawn, flat or square‡	3.90	4.15	4.10
Structural shapes	3.30†	3.00	3.10†
Soft steel bars	3.25†	3.00	3.00†
Soft steel bar shapes	3.25†	3.00	3.00†
Soft steel bands	3.75†	3.65	3.20†
Tank plates	3.30†	3.00	3.10†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, ⅜-in. thick by ¾-in. wide. †Up to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse— 3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ½, 7.35c. per lb.

METALS

Warehouse Prices in Cents Per Pound for Small Lots:

Copper, electrolytic, New York			19.25
Tin, Straits, pigs, New York			38.75@39.75
Lead, pigs, E. St. Louis	5.50	New York	6.50@ 7.00
Zinc, slabs, E. St. Louis	4.90	New York	6.50@ 7.50

	New York	Cleveland	Chicago
Antimony, slabs	11.00@11.50	11.87½	14.50
Copper sheets, base	27.75	27.75	27.75
Copper wire, base	20.12½	20.12½	20.12½
Copper, drawn, round, base	26.25	26.25	26.25
Copper tubing, base	29.25	29.25	29.25
Brass sheets, high, base	23.25	23.25	23.25
Brass tubing, high, base	28.25	28.25	28.25
Brass rods, high, base	21.25	21.25	21.25
Brass wire, high, base	23.75	23.75	23.75

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%.....	25@26	24.30	24.30
Zinc sheets (casks).....	10.75@11.25	12.25	10.11
Solder (½ and ½).....	27.50	27.50	26@28
Babbitt metal, delivered in case lots, New York, cents per lb:			
Genuine, highest grade.....			54.00
Commercial genuine, intermediate grade.....			41.00
Anti-friction metal, general service.....			31.00
No. 4 babbitt, f.o.b.....			11.00

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va:

	Nickel	Monel Metal
Sheets, full finished.....	52.00	42.00
Sheets, cold rolled.....	60.00	50.00
Strip, cold rolled.....	55.00	45.00
Rods, hot rolled.....	45.00	35.00
Rods, cold drawn.....	53.00	40.00
Tubing	75.00*	90.00†
Angles, not rolled.....	50.00	40.00
Plates.....	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper.....	14.75 @15.25	13.50	14.00 @14.50
Copper, heavy, and wire..	13.50 @14.00	13.00	13.00 @13.50
Copper, light, and bottoms	12.00 @12.25	12.00	12.00 @12.50
Heavy lead.....	4.25 @ 4.75	5.25	3.50 @ 4.00
Tea lead.....	2.75@ 3.00	3.25	2.50 @ 3.00
Brass, heavy, yellow.....	7.75 @ 8.00	8.00	7.25 @ 7.75
Brass, heavy, red.....	11.25 @11.75	12.50	10.25 @10.75
Brass, light.....	6.25 @ 6.75	7.00	6.25 @ 6.75
No. 1 rod-brass turnings..	9.00 @ 9.25	8.00	8.00 @ 8.50
Zinc.....	2.50 @ 2.75	3.00	2.00 @ 2.50

TIN PLATES—Charcoal—Bright—Per box:

	New York	Cleveland	Chicago
"AAA" Grade:			
IC, 14x20.....	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20.....	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20.....	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20.....	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb..	$0.13*	$0.16	$0.15
Cotton waste, colored, per lb..	.09½*	.12	.12
Wiping cloths, washed, white, per lb.....	.12½	38.00 per M	.16
Sal soda, per lb.....	.02¼	.02	.02
Roll sulphur, per lb.....	.028	.03½	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.....	.15	.164	152
Cutting oil, about 25% lard, in 5 gal. cans, per gal.....	.75	.60	.65
Machine oil, medium-bodied (55 gal. steel bbl.) per gal..	.33	.36	.24
Belting — Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin. ft., per inch of width, for single ply:			
Medium grade.....	30–10%	30–10%	35%
Med. grade, heavy wgt..	30%	30– 5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft:			
First grade.....	50%	50–10%	50%
Second grade.....	60%	60– 5%	50–10%

*Grade F.

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars.....	per lb..	$0.0325	$0.0325	$0.0325
Cold drawn shafting...	per lb..	.034	.034	.035
Brass rods.....	per lb..	.2125	.2125	.215
Solder (½ and ½).....	per lb..	.275	.2925	.3475
Cotton waste, white...	per lb..	.13	.13	.10@.13½
Disks, aluminum oxide mineral, cloth, No. 1, 6-in. dia.....	per 100.	4.59	4.59	3.59
Lard cutting oil.....	per gal.	.75	.65	.55
Machine oil.....	per gal.	.33	.33	.33
Belting, leather, medium.....	off list..	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs...	off list..	50-10%*	50–10%*	50–10%*

*List prices as of April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*.....	$6.03	$6.03	$6.03
Emery cloth*.....	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†.....	2.61	2.61	2.61
Cloth†.....	4.59	4.59	4.59
Fire clay, per 100 lb. bag.....	1.00	.75	.75
Coke, prompt furnace, per net ton.....	Connellsville,		2.60
Coke, prompt foundry, per net ton.....	Connellsville,		3.50@4.85
White lead, dry.....	100 lb. kegs ...	New York,	13.75
White lead, in oil.....	100 lb. kegs....	New York,	14.25
Red lead, dry.....	100 lb. kegs....	New York,	13.75
Red lead, in oil.....	100 lb. kegs....	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less.....	60%
Larger, up to 1 x 30-in., full kegs, list less.....	50–10%
Less than full kegs or case lots, add to list.....	10%
Fitting-up bolts: list less.....	45%
Lag screws:	
Up to ½-in. x 6-in., list less.....	60%
Larger, list less.....	50–10%
Less than full keg or case lots, add to list.....	10%
Rivets:	
Structural, round head, full kegs, net.....	$4.50
Structural, round head, broken kegs, net.....	6.00
Tank, 7/16-in. dia. and smaller, list less.....	60%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less.....	60%
Larger, up to 3-in., list less.....	40–10%
Less than keg or case lots, add to list.....	10%
Washers:	
Wrought, full kegs, per 100 lb., list less.....	$4.00
Wrought, broken kegs, per 100 lb., list less.....	2.00
Turnbuckles:	
With stub ends, list less.....	20%
Without stub ends, list less.....	50%
Chain:	
Proof coil, base, per 100 lb., net.....	$8.50
Cast iron welding flux, per lb., net.....	.35
Bronzing flux, per lb., net.....	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Fla., Jacksonville — Bd. of County Commissioners, H. J. Redavats, Chn., Court House—will receive bids until Apr. 1, for a 3 ton traveling crane for garage and shop at Duval County Prison Farm.

Mass., Dorchester (Boston P. O.)—Schoolhouse Dept., City Hall, Boston—manual training equipment for proposed new high school. Estimated cost $1,000,000.

Mass., Ipswich — City, A. H. Walton, Town Hall—5 to 10 ton crane for proposed electric light plant addition.

Mass., Lynn—Owner, 313 Broad St.—3 spindle Allen drill and 4½ Stark lathe.

O., Newark—Superior Welding & Machine Co., 58 West Main St., C. H. Harris, Mgr.—24 in. lathe and air compressor for machine shop.

Opportunities for Future Business

Calif., Alameda—Union Oil Co., Mills Bldg., San Francisco, plans the construction of a distribution plant including garage, warehouses, loading platform, etc. on Grand St., here. Estimated cost $90,000. Private plans.

Calif., Oakland — Barrow Corp., Lynchburg, Va., awarded contract for the construction of a 2 story, 80 x 106 ft. factory, etc., here. Estimated cost $40,000.

Calif., San Leandro—United Engine & Machine Co., 507 Broadway, Fresno, plans the construction of a machine shop, etc. for the manufacture of patented pistons for automobiles on Preda Ave., here. Estimated cost $35,000.

Conn., Bridgeport — Standard Oil Co., J. L. McIntyre, 154 Admiral St., is receiving bids for the construction of a service station on Fairfield St. Estimated cost $40,000. Private plans.

Ill., Chicago—American Can Co., 230 Park Ave., New York, N. Y., plans addition to plant, here. Estimated cost $2,000,000. Private plans. Maturity about July 1.

Ill., Chicago—Marquette Tool & Mfg. Co., 1900 North Kilbourne Ave., plans the construction of a 1 story, 150 x 202 ft. factory, for the manufacture of large presses equipped with pneumatic cushions. Foltz & Co., 510 North Dearborn St., Archts.

Ind., Chalbridge City—White Star Oil Co., awarded contract for the construction of a machine shop and service station at Main and Milton Rd. Estimated cost $44,000. Werking, Werking & Fallon, Richmond, Archts. Noted Jan. 16.

Ind., Terre Haute—American Can Co., 230 Park Ave., New York, N. Y., will receive bids about June 1, for addition to plant, here. Estimated cost to exceed $250,000.

Mass., Ashland — Warren Telechron Co., awarded contract for a 2 story addition to factory. Estimated cost $40,000. Noted Feb. 20.

Mass., Athol—N. D. Cass, 62 Canal St., is having plans prepared for a 3 story, 60 x 100 ft. toy manufacturing plant on Canal St. Estimated cost $50,000. Private plans.

Mass., Attleboro—G. A. Sweeney, 160 South Main St., awarded contract for a 1 story repair and service garage on County St. Estimated cost $40,000. Central Automobile Co., Lessee. Noted Mar. 6.

Mass., New Bedford—City, E. B. Hammond, Chn. and Pres. Bd. of Trustees, will receive bids about Apr. 1 for the construction of a 2 and 3 story, 65 x 170 ft. vocational school including work shops, etc. Estimated cost $250,000. C. Hammond & Son, North Water St., Archts.

Mass., Pittsfield — Berkshire Auto Co., 109 South St., will receive bids until Apr. 7, for a 2 story, 60 x 200 and 60 x 144 ft. garage and sales and service station on South St. Estimated cost $140,000. G. E. Haynes, 27 George St., Archt.

Miss., Aberdeen—Chamber of Commerce, c/o M. M. Mims, Secy., is having preliminary plans prepared for the construction of an airport including hangars, shops, etc.

Miss., Yazzo City—Woolwine & Hull, will receive bids until Apr. 4 for the construction of a 1 story, 140 x 160 ft. garage, etc. N. W. Overstreet, Jackson, Archt.

Neb., Omaha — Union Pacific System, 15th and Dodge St., plans the construction of a garage and repair shops. Estimated cost $1,000,000. H. C. Mann, Ch. Engr.

N. H., Laconia—Scott & Williams Inc., 266 Union Ave., manufacturers of knitting machinery, awarded contract for the construction of a 4 story, 65 x 270 ft. factory. Estimated cost $100,000. Noted Mar. 13.

N. J., Linden—Commercial Steel Equipment Co., 1024 Elizabeth Ave., is having plans prepared for the construction of a 1 story factory. Estimated cost $40,000. A. J. Silberstein, 868 Broad St., Newark, Archt.

N. J., Newark—P. B. West, 24 Commerce ..., Archt., will receive bids about Apr. 15 for the construction of a 2 story factory at Maple Pl. for General Alloy Co., 188 New Jersey R.R. Ave. Estimated cost $40,000. Noted Mar. 20.

N. J., Newark—National Washer Co., Pennington St., awarded contract for a 4 story, 75 x 105 and 36 x 50 ft. factory. Estimated cost to exceed $40,000. Noted Mar. 6.

N. J., Perth Amboy—Standard Underground Cable Co., H. B. Wodthke, awarded contract for the construction of a plant. Estimated cost $200,000.

N. J., Trenton—J. A. Roebling & Sons Co., 2120 Hudson Terrace, wire manufacturers, awarded contract for the construction of a 1 story, 220 x 320 ft. mill. Estimated cost $300,000.

N. J., West New York—O. L. Auf Der Heide, 443 16th St., will build a 1 story, 100 x 125 ft. garage, etc. at 16th St. between Buchanan Pl. and Broadway. Estimated cost $150,000. C. H. A. Miller, 322 15th St., Archt. North Jersey Auto Sales Co., 729 Bergenline Ave., lessee. Noted Mar. 6.

N. Y., Astoria—F. Benes, 3619 Grand Ave., plans the construction of a 3 story garage, etc. at 28th Ave. and 31st St. Estimated cost $100,000.

N. Y., Buffalo—Buffalo Foundry & Machine Co., Fillmore Ave., awarded contract for a 1 and 2 story, 103 x 137 ft. addition to machine shop at Fillmore and Ferry Sts. Estimated cost $79,000. Noted Mar. 20.

N. Y., Hastings-On-Hudson—American Brass Co., Grand and Meadow Sts., Waterbury, Conn., is having plans prepared for addition to wire and cable drawing plant, here. Estimated cost $450,000. Private plans.

N. Y., Long Island City—M. G. C. Realty Co., c/o J. S. Kennedy, 157 Remsen St., plans the construction of a 100 x 120 ft. garage at 101 Ave. and 121st St. Estimated cost $40,000. J. S. Kennedy, 157 Remsen St., Brooklyn, Archt.

N. Y., New York—Dept. of Correction, plans the construction of a group of buildings including 117 x 135 ft. automobile storage building and shop, $63,000; 52 x 290 ft. maintenance shop, $116,640; 25 x 359 ft. warehouse $575,050.

N. Y., New York—Indian Building Corp., 1154 Ward Ave., will build a garage at 38th St. and First Ave. Estimated cost $250,000. Becker & Levy, 349 East 149th St., Archts. Work will be done by separate contracts. Maturity indefinite.

N. Y., New York—W. Shary, 22 East 17th St., Archt., will receive bids about June 1, for the construction of a 7 story, 75 x 100 ft. garage at 205 West 101st St. for Two Hundred Five West 101st St. Corp., 52 Broadway. Estimated cost $150,000. Noted Mar. 13.

N. Y., New York—Sobel Bros., 5th Ave. and 110th St., plans the construction of a service station and repair shop at St. Nicholas Pl., St. Nicholas Ave. and 150th St. Estimated cost $40,000.

N. Y., New York—Standard Concrete Steel Co., 250 8th Ave., plans the construction of a 2 story, 75 x 100 ft. garage and warehouse at 217 West 19th St. Estimated cost $40,000. R. L. Senior, c/o owner, Archt.

N. Y., New York—H. Weprin, 145 West 27th St., will build a garage at 38 East 85th St. Estimated cost $150,000. W. L. Hohauser, 17 West 44th St., Archt. Work will be done by day labor and separate contracts.

N. Y., St. George (sta. Staten Island)—Dept. of Water, Gas & Electricity, New York, awarded contract for the construction of a 42 x 73 ft. garage and repair shop at Ontario Ave. and Victory Blvd. Estimated cost $60,000. Noted Jan. 16.

O., Cleveland—The Atlas Steel & Lumber Co., M. B. Abrams, Pres. and Treas., 4401 Trumbull Ave., is having plans prepared for the construction of a 1 story, 97 x 150 ft. machine shop, etc. Estimated cost $50,000. W. J. Wefel, 5716 Euclid Ave., Archt.

O., Cleveland—J. J. Rutkowski Inc., 5200 Harvard Ave. (iron and steel), is having plans prepared for the construction of a 1 story machine shop. Estimated cost $50,000. Private plans.

Pa., Black Lick — Atterbury Corp., E. T. Ryan, Secy. and Treas., Pittsburgh, has work under way on the construction of a valve plant here. Estimated cost $300,000. Private plans.

Pa., Bridgeville—The Selden Co., 210 McCartney St., Pittsburgh, awarded contract for the construction of a 2 story, 110 x 150 ft. cooperage storage plant and warehouse at Millers Run, here. Estimated cost $50,000.

Pa., Eddystone—Eddystone Mfg. Co., (print works), awarded contract for a 1 story, 70 x 145 ft. addition to plant.

Pa., Philadelphia — Nicetown Plate Washer Co., 4250 Wissahickon Ave., plans addition to factory. Estimated cost $75,000. C. E. Wunder, 1520 Locust St., Archt.

Pa., Pittsburgh — Crucible Steel Co., F. B. Hufnagle, Pres., Oliver Bldg., awarded contract for a 1 story factory on 31st St. Estimated cost $50,000.

Pa., Pittsburgh—Manchester Auto & Machine Co., 916 Manchester Blvd., will build a 1 story, 160 x 310 ft. garage and repair shop at 900 Columbus Ave. and St. Ives St. Private plans. Work will be done by separate contracts. Noted Oct. 17.

R. I., Providence—New England Auto Body & Radiator Co., 56 Federal St., awarded contract for additions and alterations to radiator shop on Federal St. Estimated cost $40,000.

Tex., Houston — Midwest Piping & Supply Inc., 1450 South Second St., St. Louis, Mo., plans the construction of a plant for the fabrication of large pipe at Bringhurst and Cline Sts., here. Estimated cost $250,000.

Wash., Seattle—Bureau of Yards & Docks, Navy Dept., Washington, D. C., will soon award contract for the construction of a storehouse and engine and overhaul shop, etc., here, also awarded contract for a shop building, warehouse, etc. at Sand Point Naval Station. $200,000.

Wis., Hales Corners—The Milwaukee Electric Railway & Light Co., 217 Michigan St., Milwaukee, will soon award contract for a 1 story, 62 x 139 ft. and 62 x 109 garage buildings, here. Estimated cost $44,000 and $40,000 respectively.

Ont., Penetanguishene — Dominion Stove & Foundry Co. Ltd., plans the construction of a plant. Estimated cost $100,000.

Ont., St. Catherines—W. S. Tyler Co., West 36th St. and Superior Ave., Cleveland, O. (ornamental iron and bronze), is having plans prepared for the construction of a factory here. Estimated cost $150,000. G. S. Rider Co., Marshall Bldg., Cleveland, Archt.

Sask., Prince Albert—Grosser & Glass Ltd., Kerr-Robert, plans the construction of a 50 x 100 ft. machine shop. Estimated cost $75,000.